DELIVERABLE (COMBINED) 212A AND 212E

PONDSLUDGE SAMPLING PROCEDURE
AND
CLARIFIER SAMPLING PROCEDURE

For:

EG&G Rocky Flats

ORIGINAL

Prepared by:

HALLIBURTON NUS ENVIRONMENTAL CORPORATION

August, 1991

FOR APPROVAL SIGNATURE BY
EG&G ROCKY FLATS

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TITLE:
POND SLUDGE SAMPLING PROCEDURE AND CLARIFIER SAMPLING PROCEDURE

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ORIGINAL

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STANDARD OPERATING PROCEDURE

SOLAR POND AND CLARIFIER
WATER AND SLUDGE SAMPLING FOR
WASTE CHARACTERIZATION AND TREATABILITY STUDY

I. INTRODUCTION

A. Purpose:

To obtain representative water and sludge samples from the clarifier and solar ponds, for the purposes of physical and chemical characterization and treatability study. The analyses may include the following parameters: total cyanide, metals, inorganic anions, and other inorganic constituents; organic constituents; levels of radioactivity; and engineering and geotechnical parameters.

B. **Personnel Requirements:**

All sampling personnel are required to have an RFP active respirator fit certification and Building 788 indoctrination. Personnel must meet the minimum training and medical monitoring requirements specified in 29 CFR Part 1910.120. Personnel must have DOE "Q" clearance or prior arrangements for an escort must be made.

EG&G Personnel
Radiological Protection Technician (RPT) (2)
Minimum eight support personnel

C. Related Documents:

1. The Rocky Flats Plant H&S Practices (HSP) Manual defines procedures for personnel protection.

2. A site specific "Health and Safety Plan for Sampling Solar Pond Water, Sludge, and Sediment" prepared April 1, 1991 under Rocky Flats Work order 2029-33-13. Each member of the field team must read and sign the plan.

3. A Radiological/H&S Work Permit form (RF-13010) shall be completed before commencing sampling activities (Attachment 1).

4. Shipping Memo (RF-24320) (12/89)* shall be completed, reviewed and approved by the Rocky Flats Traffic Department. The Rocky Flats Traffic Department will prepare the proper shipping documents before shipment of samples. (Attachment 2).

5. Radioactive Shipment Preparation Certification (RF-46404)* shall be completed by persons packaging samples (Attachment 3). The completed form shall be delivered to the Traffic Department at least one day prior to scheduled off-site transportation.

6. Halliburton NUS Chain of Custody Forms (Form Number 440340484) (Attachment 5).

7. On-site transportation of water and sludge samples will be accomplished pursuant to the procedures listed in the document entitled "On-Site Transportation Manual, Traffic Department" January, 1991.

8. Halliburton NUS Deliverable (Combined) 211A, 211E, 221A and 221E - Pondsludge and Clarifier Sludge Sampling and Analysis Plans.

9. EG&G Rocky Flats Quality Assurance Manual.

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* Related Documents 4 and 5 must arrive together at the Rocky Flats Traffic Department

D. **Equipment:**

Those items indicated with an asterisk will be provided by EG&G. EG&G will also provide locker facilities. Double asterisk indicates items supplied by Halliburton NUS. Unmarked items have previously been assembled.

Health and Safety

Full-face respirators with approved combination cartridges (GMC-H) for organic vapor and radionuclides*
Safety Shoes
Rubber boots with steel toes
Cotton booties* (if required by the RPT)
Surgical undergloves*
Viton gloves
Nitrile Gloves
Leather work gloves*
Coveralls and undergarments*
Saranex coveralls
Tyvek Coveralls*
Monitoring instrumentation as required by approved Health and Safety Plan
Radiation survey instruments*
2 personal life preservers*
3/8 inch polypropylene rope*
Safety harness*
Yellow tape*
Paper towels
Portable radio*
Real-time air monitoring equipment as required by EG&G*

Sampling
Pond boats*
Pontoon Boat*
100-gallon tank with fixture to decant water
Sample dipper with 3-foot handle (Teflon)*
Bailer (Teflon) with bottom fill value attachment
Ponar™ and Eckman™ dredge*
10-foot sludge coliwasa*
Sludge scoop
Glass funnel
Hoist system (for clarifier tank)
Stainless steel buckets*
Stainless steel bowl*
Winch assembly
Sample scoops (plastic and stainless steel)
Sample bottles as per Tables 2 through 6**
Sample labels (preprinted)**
Ziploc™ plastic bags or equivalent
Polyethylene sheeting*
Aluminum foil*
Chain-of-custody seals**
Smear paper (pre-numbered and provided by EG&G RPT)*
Tape measure
Sample coolers**
Frozen gel-packs

* materials provided by EG&G
** materials provided by Halliburton NUS

Wood stakes*
Survey Rod
Hand Level and tripod
1000 ml squeeze dispenser bottle*
Deionized water
Long-handled rake
pH meter
Conductivity meter

Decontamination
Deionized water (5 gallons)
Tap water (5 gallons)
2 wash and 3 rinse tubs*
Bottle brushes with soft bristles*
Alkaline, non-sudsing detergent (Alconox™ or equivalent)*
Kimwipes or papertowels
Plastic waste disposal bags*
5-gallon containers for wastewater
Funnel
Pressure sprayers*

Record keeping
Bound field notebook with pre-numbered pages**
Chain-of-custody forms (original with 5 carbon copies)**
Black pens

Packaging and Shipping
Sample coolers**
Wheaton™ Safety Shippers (or equivalent)*
1/2-gallon and 1 gallon paint cans with caps
Drums (DOT17C, DOT34, DOT6C, DOT6D, overpacks) listed in Tables 6, 7, and 8
Drum sling
Sockets for tightening drum bolts (see ATTACHMENT 6)
Absorbent material
Polyethylene bags
Ziploc™ plastic bags for Halliburton NUS Form Number 440340484
Labels that read: "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for excepted RADIOACTIVE MATERIALS, LIMITED QUANTITY, n.o.s., UN2910."
Labels that read: "CAUTION RADIOACTIVE MATERIAL"*
Labels that read: "Environmental Samples"
Labels that read: "ORM-E"
Labels that read: "RADIOACTIVE-LSA"
EG&G Labels for outside of shipping container that provide the name and address of consignor and consignee** - NUS prepare
2" Packing tape (clear and reinforced)*
Tape (yellow)*
Digital balance*
Frozen gel packs
Chain-of-custody seals**
Completed RF-24320 - Shipping Memo (typed)*
Completed RF-46404 - Radioactive Shipment Preparation Certification*
Completed RF-13070 - Material Transfer Tag*
Completed RFW 21-21-001/A - Custody Transfer Record/Lab Work Request or NUS equivalent
48"x48" Wooden pallets*
Cardboard corners*
Banding machine w/1" steel bands*

* materials provided by EG&G
** materials provided by Halliburton NUS

E. Preliminary Arrangements:

Boating Safety

Field samplers will receive boating safety training and review boating procedures prior to initiating sampling. Training will cover entering and exiting the boat and the collection of samples. Boating safety is discussed in the health and safety plan.

Layout of Sample Locations

Sample locations for each quadrant of each pond will be marked according to the following procedure. The length of each edge will be measured with a tape measure. Wooden stakes will be driven into the top of the berm and beyond the pond liner at points 1/4 and 3/4 along each length.

EG&G Logistical Support

Mr. Ernest Lombardi will be responsible for scheduling and ensuring the availability of the EG&G personnel and equipment. EG&G will be responsible for providing personnel for sampling and support, and for coordinating the on-site transportation and storage of samples at designated locations. EG&G personnel will complete a Radiological/H&S Work Permit form (RF-13010) daily.

Pre-evolution

Before commencement of daily operations, a "pre-evolution" meeting will be held in T750 or T788. All personnel will be advised of daily operations, health and safety issues, and sign off on Radiological/H&S Work Permit. All personnel conducting sampling and/or packaging activities are required to wear appropriate EG&G clothing.

Corrective Action

Corrective action will be accomplished in accordance with Section 13.0 of Deliverable (Combined) 211A, 221E, 221A, and 221E - Pondsludge and Clarifier Sludge Sampling and Analysis Plan.

Quality Assurance

In accordance with EG&G Rocky Flats Quality Assurance Manual.

Health and Safety

In accordance with Health and Safety Plan for Sampling Solar Pond Water, Sludge, and Sediment dated April, 1991, prepared under Rocky Flats Work Order #2029-33-13.

F. **Waste Characterization Sampling Procedure Summary:**

The sampling and packaging procedures developed for the solar ponds and clarifier are based on the chemical and radiological screening data obtained from analysis performed by EG&G laboratories. The existing gross alpha and gross beta data obtained for water in all ponds, and sludge from the 207B series ponds and 207A pond, suggests that these samples are not radioactive as determined by the Department of Transportation (DOT) definition of a radioactive material (> 2 nCi/g) (49 CFR Part 173 Subpart I - 173.403(y).

The pond 207C sludge was sampled and subjected to gross alpha and beta screening by the 881 Laboratory. Results of the screening indicate the sludge meets the DOT definition of a radioactive material (> 2 nCi/g); therefore, the sludge from Pond 207C will be sampled, packaged, and shipped per DOT requirements for RADIOACTIVE MATERIAL, LIMITED QUANTITY or RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY N.O.S. (49 CFR 173.425) depending on volume. The existing screening data and isotope specific data will be used to determine the sample quantity to be collected to comply with package limits for limited quantity radioactive materials. Water and sludge from the B-series and 207A ponds will be shipped "Environmental" (no DOT hazard class) or as DOT hazard class ORM-E depending on results of recent characterization sampling and analysis.

The clarifier water and sludge media was sampled by EG&G for gross alpha and beta screening by EG&G Laboratories. Data from screening indicates that the clarifier sludge meets the DOT definition of radioactive material (>2nCi/g) and will therefore be packaged and shipped per DOT requirements for RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, N.O.S. The clarifier water does not meet the DOT definition of radioactive material or DOT hazard class ORM-E and will therefore be packaged and shipped as "Environmental Samples".

Analytical procedures will follow the specified methods in the Halliburton NUS Deliverable (Combined) 211A, 221E, 221A and 221E - Sampling and Analysis Plan for Solar Ponds and the Clarifier. Table 1 summarizes the sample volumes requested for characterization and treatability for each pond and the clarifier. Tables 2 and 3 summarize bottle requirements for analysis of water and sludge for Ponds 207A, 207B series, and 207C, respectively. Tables 4 and 5 summarize bottle requirements for clarifier water and sludge, respectively. Tables 6, 7, and 8 summarize DOT Hazard Class and packaging requirements. ATTACHMENT 6 outlines drum inspection and drum closure procedures.

G. Treatability Study Sampling Procedure Summary:

Sampling procedures developed for treatability study samples of the solar ponds and clarifier are based primarily on the sample volumes defined by Halliburton NUS. These volumes are summarized in Table 1. Specific packaging, marking, and labeling procedures for treatability study samples will be based on the chemical and radiological data from analysis performed by EG&G/WESTON. Existing screening data on the solar pond water and solar pond sludge for 207B series ponds and 207A pond suggest these samples do not meet the DOT definition of radioactive material. Therefore, samples will be packaged as either "Environmental Sample" (no DOT hazard class) or as DOT hazard class ORM-E (see Procedure II, C.) depending on the results of recent characterization sampling and analysis.

Screening results and existing data indicate treatability study sludge samples from Pond 207C and sludge from the clarifier meet the DOT definition of radioactive material (>2nCi/g). These samples will be packaged according to DOT requirements for RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, N.O.S., due to larger volume requirements for treatability study. Clarifier water samples do not meet the DOT definition of radioactive material or DOT hazard class ORM-E and will therefore be packaged and shipped as "Environmental Samples".

DOT specification drums will be used as the inner and outer container. The inner and outer containers are specified and summarized in Tables 7 and 8 for both sludge and water samples and are based on the expected DOT hazard classifications summarized in Table 6.

Both water and sludge treatability study sample volumes will be collected by using stainless steel buckets and a Ponar™ Dredge, respectively. The required volumes will be placed into the DOT specification containers.

TABLE 1
VOLUME OF MEDIA TO BE COLLECTED DURING SOLAR POND AND CLARIFIER SAMPLING
ROCKY FLATS FACILITY

TABLE 1							TABLE A			
WASTE SOURCE	LOCATION	TOTAL DISCRETE SAMPLE COLLECTED VOLUME	TOTAL DISCRETE VOLUME SHIPPED TO HALLIBURTON NUS FOR CHARACTERIZATION	TOTAL DISCRETE VOLUME SHIPPED TO HALLIBURTON NUS FOR TREATABILITY STUDY	TOTAL DISCRETE VOLUME STORED AT ROCKY FLATS	TOTAL DISCRETE VOLUME TO BE COLLECTED FOR COMPOSITE SAMPLING	TOTAL VOLUME[1] OF COMPOSITE SAMPLE	VOLUME OF COMPOSITE SAMPLE TO BE STORED AT ROCKY FLATS	VOLUME OF COMPOSITE SAMPLE TO BE SHIPPED TO HALLIBURTON NUS FOR TREATABILITY STUDY	VOLUME OF COMPOSITE SAMPLE TO BE SHIPPED TO HALLIBURTON NUS FOR CHARACTERIZATION
Pond 207A Sludge	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207A Water	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207B (North) Sludge	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207B (North) Water	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207B (Center) Sludge	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal

(1) Pond Composite Sample = 16 gal (Quad I) + 16 gal (Quad II) + 16 gal (Quad III) + 16 gal (Quad IV) = 64 gal.
Clarifier Composite Sample = 12 gal (Location 1) + 12 gal (Location 2) + 12 gal (Location 3) = 36 gal.

TABLE 1 (Continued)
VOLUME OF MEDIA TO BE COLLECTED DURING SOLAR POND AND CLARIFIER SAMPLING
ROCKY FLATS FACILITY
PAGE TWO

TABLE 1							TABLE A			
WASTE SOURCE	LOCATION	TOTAL DISCRETE SAMPLE COLLECTED VOLUME	TOTAL DISCRETE VOLUME SHIPPED TO HALILIBURTON NUS FOR CHARACTERIZATION	TOTAL DISCRETE VOLUME SHIPPED TO HALLIBURTON NUS FOR TREATABILITY STUDY	TOTAL DISCRETE VOLUME STORED AT ROCKY FLATS	TOTAL DISCRETE VOLUME TO BE COLLECTED FOR COMPOSITE SAMPLING	TOTAL VOLUME[1] OF COMPOSITE SAMPLE	VOLUME OF COMPOSITE SAMPLE TO BE STORED AT ROCKY FLATS	VOLUME OF COMPOSITE SAMPLE TO BE SHIPPED TO HALLIBURTON NUS FOR TREATABILITY STUDY	VOLUME OF COMPOSITE SAMPLE TO BE SHIPPED TO HALLIBURTON NUS FOR CHARACTERIZATION
Pond 207B (Center) Water	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207B (South) Sludge	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207B (South) Water	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207C Sludge	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal
Pond 207C Water	Quad I Quad II Quad III Quad IV	40 gal 40 gal 40 gal 40 gal	2 gal 2 gal 2 gal 2 gal	10 gal 10 gal 10 gal 10 gal	12 gal 12 gal 12 gal 12 gal	16 gal 16 gal 16 gal 16 gal 64 gal (See Table A)	64 gal	32 gal	30 gal	2 gal

(1) Pond Composite Sample = 16 gal (Quad I) + 16 gal (Quad II) + 16 gal (Quad III) + 16 gal (Quad IV) = 64 gal.
Clarifier Composite Sample = 12 gal (Location 1) + 12 gal (Location 2) + 12 gal (Location 3) = 36 gal.

TABLE 1 (Continued)
VOLUME OF MEDIA TO BE COLLECTED DURING SOLAR POND AND CLARIFIER SAMPLING
ROCKY FLATS FACILITY
PAGE THREE

TABLE 1							TABLE A			
WASTE SOURCE	LOCATION	TOTAL DISCRETE SAMPLE COLLECTED VOLUME	TOTAL DISCRETE VOLUME SHIPPED TO HALLIBURTON NUS FOR CHARACTERIZATION	TOTAL DISCRETE VOLUME SHIPPED TO HALLIBURTON NUS FOR TREATABILITY STUDY	TOTAL DISCRETE VOLUME STORED AT ROCKY FLATS	TOTAL DISCRETE VOLUME TO BE COLLECTED FOR COMPOSITE SAMPLING	TOTAL VOLUME[1] OF COMPOSITE SAMPLE	VOLUME OF COMPOSITE SAMPLE TO BE STORED AT ROCKY FLATS	VOLUME OF COMPOSITE SAMPLE TO BE SHIPPED TO HALLIBURTON NUS FOR TREATABILITY STUDY	VOLUME OF COMPOSITE SAMPLE TO BE SHIPPED TO HALLIBURTON NUS FOR CHARACTERIZATION
Clarifier Water	Location 1 Location 2 Location 3	14 gal 14 gal 14 gal	2 gal 2 gal 2 gal	0 gal 0 gal 0 gal	0 gal 0 gal 0 gal	12 gal 12 gal 12 gal 36 gal (See Table A)	36 gal	18 gal	16 gal	2 gal
Clarifier Sludge	Location 1 Location 2 Location 3	14 gal 14 gal 14 gal	2 gal 2 gal 2 gal	0 gal 0 gal 0 gal	0 gal 0 gal 0 gal	12 gal 12 gal 12 gal 36 gal (See Table A)	36 gal	18 gal	16 gal	2 gal

1) Pond Composite Sample = 16 gal (Quad I) + 16 gal (Quad II) + 16 gal (Quad III) + 16 gal (Quad IV) = 64 gal.
Clarifier Composite Sample = 12 gal (Location 1) + 12 gal (Location 2) + 12 gal (Location 3) = 36 gal.

TABLE 2
SUMMARY OF ANALYSES, BOTTLE REQUIREMENTS, AND HOLDING TIMES
ROCKY FLATS FACILITY

Media	Analysis	No. of Samples	No. of Containers/Sample	Type of Container	Preservation Requirements	Holding Times
Pond Water	Chemical Characterization • Selected VOAs	36	2	40 mL VOA Vials	Cool to 4°C	14 Days[1]
	• Selected Semivolatiles	31	2	1/2 Gallon Amber Glass	Cool to 4°C	7 Days to Extraction; 40 Days to Analysis
	• Selected Alcohols	31	1	1 40 ML VOA vial	Cool to 4°C	Not Applicable
	• Cyanide (total & amenable)	31	2	1 Gallon Plastic	Cool to 4°C	14 Days
	• Arsenic • Barium • Boron • Cadmium • Chromium (Total) • Lead • Nickel • Selenium • Silver • Sodium • Calcium • Magnesium • Potassium • Mercury	31	*	*	Cool to 4°C	180 Days, holding time for Mercury is 28 Days
	• Nitrate • Ammonia • Total Organic Carbon (TOC)	27	*	*	Cool to 4°C	28 Days
	• TCLP (As,Ba,Cd,Cr,Pb,Hg,Ni,Se,Ag,pH)	31	*	*	Cool to 4°C	pH 14 Days, 180 Days to Leach
	• Alkalinity (methyl orange) • Alkalinity (phenolphthalein) • Total Dissolved Solids (TDS) • Total Suspended Solids (TSS) • pH • Specific Gravity • Sulfate • Chloride • Phosphate	27	*	*	Cool to 4°C	14 Days, Phosphate holding time is 48 hours
	Rad Parameters • Gross Alpha & Gross Beta	31	*	*	Cool to 4°C	180 Days

(1) VOAs have a holding time of 14 Days because wastes are concentrated wastes, SW 846.

• Same sample container as cyanide.

TABLE 3
SUMMARY OF ANALYSES, BOTTLE REQUIREMENTS, AND HOLDING TIMES
ROCKY FLATS FACILITY

Media	Analysis	No. of Samples	No. of Containers/Sample	Type of Container	Preservation Requirements	Holding Times
Pond Sludge	Chemical Characterization • Selected VOAs	36	1	Wide mouth 4 oz. Jars	Cool to 4°C	14 Days
	• Selected Alcohols	31	*	*	Cool to 4°C	Not Applicable
	• Selected Semivolatiles	31	**	**	Cool to 4°C	7 days to extraction; 40 days to analysis
	• Cyanide (Total) • Arsenic • Barium • Boron • Cadmium • Chromium (Total) • Lead • Magnesium • Nickel • Potassium • Selenium • Silver • Sodium • Mercury	31	4	32 oz. Jar	Cool to 4°C	180 Days, Mercury holding time is 28 days
	• pH (sample slurried in distilled water) • TCLP (As,Ba,Cd,Cr,Pb,Hg,Ni,Se,Ag,pH)	31	**	**	Cool to 4°C	14 Days
	• ASTM Leach[1] - Phosphate (ortho) - Sulfate - Nitrate - Chloride - TDS	27	**	**	Cool to 4°C	28 Days
	• Total Organic Carbon (TOC) • Ammonia	27	**	**	Cool to 4°C	28 Days
	Rad Parameters • Gross Alpha & Gross Beta	31	**	**		180 Days
	Geotechnical Parameters • Moisture - Karl Fisher Method - Gravimetric Method	25	1	4 oz. Jar	Cool to 4°C	None
	• Bulk Density[2] • Specific Gravity[2] • Blaine Finness Test • Atterberg Limits • Swell Test	25	1	32 oz. Jar		None
	• Particle Size	25	1	32 oz. Jar for Ponds 207A and 207 BS, BC, and BN 5 Gallon Plastic Bucket for Pond 207C		None

(1) Determination of mass of solid lost after leach test performed. Sample mass will be filtered and dried to determine what portion of the solids dissolved.
(2) Analysis will be performed on sample as received and then on sample after filtration and drying.

* Same sample containers and VOAs
** Same sample containers as cyanide

TABLE 4
SUMMARY OF ANALYSES, BOTTLE REQUIREMENTS, AND HOLDING TIMES
ROCKY FLATS FACILITY

Media	Analysis	No. of Samples	No. of Containers/Sample	Type of Container	Preservation Requirements	Holding Times
Clarifier Water	Chemical Characterization • Selected VOAs	8	2	40 mL VOA Vials	Cool to 4°C	14 Days[1]
	• Selected Semivolatiles	7	2	1/2 Gallon Amber Glass	Cool to 4°C	7 days to extraction; 40 days to analysis
	• Selected Alcohols	7	1	40 mL VOA Vials	Cool to 4°C	Not Applicable
	• Cyanide (total & amenable)	7	2	1 Gallon Plastic	Cool to 4°C	14 Days
	• Arsenic • Barium • Boron • Cadmium • Chromium (Total) • Lead • Nickel • Selenium • Silver • Sodium • Calcium • Magnesium • Potassium • Mercury	7	*	*	Cool to 4°C	180 Days, holding time is 28 Days
	• Nitrate • Ammonia • Total Organic Carbon (TOC)	5	*	*	Cool to 4°C	28 Days
	• TCLP (As,Ba,Cd,Cr,Pb,Hg,Ni,Se,Ag,pH)	7	*	*	Cool to 4°C	14 Days
	• Alkalinity (methyl orange) • Alkalinity (phenolphthalein) • Total Dissolved Solids (TDS) • Total Suspended Solids (TSS) • pH • Specific Gravity • Chloride • Phosphate	5	*	*	Cool to 4°C	14 Days Phosphate holding time is 48 hours
	Rad Parameters • Gross Alpha & Gross Beta	7	*	*	Cool to 4°C	180 Days

1) VOAs have a holding time of 14 because wastes are concentrated wastes, SW846.

Same sample container as cyanide.

TABLE 5
SUMMARY OF ANALYSES, BOTTLE REQUIREMENTS, AND HOLDING TIMES
ROCKY FLATS FACILITY

Media	Analysis	No. of Samples	No. of Containers/Sample	Type of Container	Preservation Requirements	Holding Times
Clarifier Sludge	Chemical Characterization • Selected VOAs	8	2	Wide Mouth 4 oz. Jars	Cool to 4°C	14 Days
	• Selected Alcohols	7	•	•	Cool to 4°C	Not Applicable
	• Selected Semivolatiles	7	**	**	Cool to 4°C	7 days to extraction; 40 days to analysis
	• Cyanide (free & amenable) • Arsenic • Barium • Boron • Cadmium • Chromium (Total) • Lead • Magnesium • Nickel • Potassium • Selenium • Silver • Sodium • Mercury	7	4	32 oz. Jar	Cool to 4°C	180 Days, Mercury holding time is 28 days
	• pH (sample slurried in distilled water) • TCLP (As,Ba,Cd,Cr,Pb,Hg,Ni,Se,Ag,pH)	7	**	**	Cool to 4°C	14 Days
	• ASTM Leach[1] - Phosphate (ortho) - Sulfate - Nitrate - Chloride - TDS	5	**	**	Cool to 4°C	28 Days
	• Total Organic Carbon (TOC) • Ammonia Rad Parameters • Gross Alpha & Gross Beta	5 7	** **	** **	Cool to 4°C	28 Days 180 Days
	Geotechnical Parameters • Moisture - Karl Fisher Method - Gravimetric Method	4	1	4 oz. Wide Mouth Jar	Cool to 4°C	None
	• Bulk Density[2] • Specific Gravity[2] • Blaine Finness Test • Atterberg Limits • Swell Test	4	1	32 oz. Jar		None
	• Particle Size	4	1	32 oz. Jar		None

1) Determination of mass of solid lost after leach test performed. Sample mass will be filtered and dried to determine what portion of the solids dissolved.
2) Analysis will be performed on sample as received and then on sample after filtration and drying.
* Same sample container as VOAs
* Same sample container as Select Semi Volatiles

TABLE 6

DOT HAZARD CLASS DESIGNATION FOR SHIPPING
SOLAR POND AND CLARIFIER WATER AND SLUDGE

SOLAR PONDS	MEDIA	DOT HAZARD CLASS
207A 207BN,BC,BS 207C	Water	N/A - Environmental Samples
207A 207BN,BC,BS	Sludge	Environmental unless exceed RQ's*, then ORM-E
207C	Sludge	Radioactive, LSA
Clarifier	Water	N/A - Environmental Samples
Clarifier	Sludge	Radioactive, LSA

* RQs = Reportable quantity from Title 49 CFR Part 172.101 Appendix.

Hazard class designation will be determined based on the identification of a proper shipping name. Rocky Flats Traffic Department will be consulted for this determination.

TABLE 7
PROPOSED PACKAGE DESIGN
WASTE CHARACTERIZATION SOLAR POND CLOSURE

MEDIA	REQUIRED VOLUME	TYPE	ANALYTES	PROPOSED PACKAGING INNER	PROPOSED PACKAGING OUTER	DOT HAZARD CLASS
Water	(3) 40 ml	QD/CP	VOC, Alcohols	A,F	G	None
	(2) 1/2 gallon	QD/CP	Semi - VOA	D	G	None
	(2) 1 gallon	QD/CP	Cyanide, metals, NO_3, Ammonia, TOC, TCLP, Alkalinity, TDS, TSS, pH, Specific gravity, SO_4, Cl^-, phosphate, gross alpha, and gross beta	E	G	None
Sludge	(1) 4 oz	QD/CP	VOC, Alcohols	B,F	G	None
				B,F	H or I	ORM-E, or Radioactive LSA
	(4) 32 oz	QD/CP	SEMI-VOA, Cyanide, metals, TCLP, ASTM, leach, TOC, ammonia, pH, gross alpha and gross beta	C,F	G	None
				C,F	H or I	ORM-E, or Radioactive LSA
	(1) 4 oz	QD/CP	Moisture	B,F	G	None
				B,F	H or I	ORM-E, or Radioactive LSA
	(1) 32 oz	QD/CP	Bulk density, specific gravity; Blaine fineness; Atterburg Limits; swell test	C,F	G	None
				C,F	H or I	ORM-E, or Radioactive LSA
	(1) 32 oz (Clarifier & Ponds 207 A, 207 BS, BC, & BN) (1) 5 gallon bucket (Pond 207C)	QD/CP	Particle size	C,F	G	None
				C,F,J	H or I	ORM-E, or Radioactive LSA

A = 40 ml glass
B = 4 oz. glass jar
C = 32 oz. glass jar
D = 1/2 gallon glass
E = 1 gallon plastic
F = 1/2 gallon or 1 gallon paint can
G = cooler
H = 5B or 6C steel drum (5 gallon)
I = 55 gallon DOT 17C (OH)
J = 5 gallon plastic

ORM-E = White drum
Radioactive, LSA = White drum

TABLE 8
PROPOSED PACKAGE DESIGN
SAMPLE VOLUMES - TREATABILITY STUDY
SOLAR POND CLOSURE

MEDIA	REQUIRED VOLUME	TYPE	PROPOSED PACKAGING OUTER	DOT HAZARD CLASS
Water	30 gallons	CP	A	None
			A*	ORM-E or Radioactive LSA
	32 gallons	ST	A	None
			A*	ORM-E or Radioactive LSA
	10 gallons	QD	C	None
			C	ORM-E or Radioactive LSA
	12 gallons	ST	C	None
			C	ORM-E or Radioactive LSA
Sludge	30 gallons	CP	B	None
			B	ORM-E or Radioactive LSA
	32 gallons	ST	B	None
			B	ORM-E or Radioactive LSA
	12 gallons	ST	C	None
			C	ORM-E or Radioactive LSA
	10 gallons	QD	D	None
			D	ORM-E or Radioactive LSA

CP = composite
ST = stored composite
QD = quadrant grab

---- = Not Applicable
A = 55-gal. poly with threaded-plug closure - DOT 34
B = 55-gal. poly removal head with lock ring - DOTE 7768
C = 15-gal. poly with threaded-plug closure - DOT 34
D = 15-gal. poly removal heads with lock ring - DOTE 7768

* = Potentially substitute A-E overpack combination with DOT 6D2SL - 55-gallon steel overpack with built-in bladder, 40 ml thickness

II. PROCEDURES

A. Procedure for Collection of Sludge and Water Characterization Samples from Solar Ponds 207A; 207BN, BC, BS; and Water only from 207C:

1. Dress in EG&G provided undergarments and coveralls. Conduct pre-evolution health & safety brief. Mobilize to Building 788.

2. Prepare sample labels for trip blanks and attach to sample bottles. A 40 ml glass bottle is used for VOA analysis. If trip blank is not pre-prepared, completely fill the bottle with deionized water such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle and ensure that there are no air bubbles in the bottle after it is inverted and tapped. Sign a custody seal and place it around the lid of the bottle, but do not cover the septa. Place the bottles in the sample cooler with frozen gel packs.

3. Organize the sample bottles according to the schedule presented in Tables 2 and 3 of this procedure. Move equipment to staging area next to pond, including:

   Monitoring instruments
   Personal protective equipment
   Sampling equipment
   Decontamination equipment
   Sample coolers

4. Lay two thicknesses of polyethylene sheeting on the ground or on top of the berm near the sampling area. The sheeting should measure approximately 10 feet x 10 feet. Place all tools and equipment on the sheeting to prevent contact with the ground or berm.

   The sampling equipment decontamination area will consist of two wash tubs and three rinse tubs. The wash station will consist of two plastic wash tubs that contain approximately 1/4 cup of detergent dissolved in approximately 2 liters of deionized water. Place a soft-bristled bottle brush into the detergent solution in each tub.

   Each of the next three stations will be sequential rinse stations that consist of a plastic wash tub filled with approximately 1 liter each of deionized water. A bottle brush or sponge will be dedicated to each of the three rinse stations.

5. Place the following sampling equipment on the polyethylene sheeting near the first decontamination station:

   Dredge
   Dipper sampler
   Sample collection bottles (per Tables 2 and 3)
   Stainless steel buckets (4)
   Stainless steel bowl
   Squeeze bottle or pressure sprayer with deionized water
   Measuring rod or tape
   Coliwasa
   Sample containers for coliwasa

Don modified Level D personal protective equipment as prescribed in the health and safety plan.

6. Disassemble the dredge. Place each of the parts of the dredge sampler into the wash tub (first station) and scrub inside and outside surfaces with a bottle brush. After washing, place the parts into the first rinse tub and remove all residual soap using another bottle brush. Repeat this procedure for the remaining two rinse stations. Shake excess water from the equipment after the final rinse and reassemble the dredge sampler. Repeat this procedure with the dipper sampler, stainless steel buckets and bowls, coliwasa, and measuring rod. Discard the wash and rinse solution as necessary to maintain its effectiveness by dumping it into the 5-gallon wastewater container. Place the dipper in a Ziploc™ bag and the dredge in the clean bowl. Measure the cross sectional area of the coliwasa.

7. Personnel assigned for sample collection will don personal protective equipment as prescribed in the health and safety plan, and enter the boat using a rope and safety harness. Place dredge, dipper, stainless steel buckets and bowls, paper towels, sludge sample collection bottle(s), and measuring tape in boat. Conduct radio check.

8. EG&G Industrial Hygiene personnel will determine maximum time personnel can perform sampling using the heat stress precautions contained in the health and safety plan. Because the adjusted air temperature can limit sampling to 30 minutes or less, a field decision will be made as to the order of quadrants, and the order of samples to obtain. From each pond quadrant, a VOA sample, water sample and a sludge sample will be taken, along with a sludge depth measurement. Complete steps 9-12 for each quadrant. The flexibility of sampling order is necessary to ensure personnel safety while maintaining efficiency.

9. Personnel on shore will guide the boat to the center point of the pond quadrant by aligning boat with the stakes on opposite shores. After the center of the quadrant has been reached, the boat position will be maintained by on-shore support personnel using the safety lines.

   Collect a grab volatile organic water sample from stern of boat with the dipper. Invert the dipper and submerge to a depth of approximately 1 foot; or just above sludge, if less than 1 foot of water is present; turn dipper upright, withdraw, and pour contents into volatile organic sample bottles. Make sure that the VOA vial is filled such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle to ensure that there are no air bubbles in the bottle after it is inverted and tapped. Wipe sample containers with paper towels and place them in available container to protect from breakage. On-shore support personnel will record in a logbook the method of collection, time of collection, and description of the sample.

10. Collect additional water sample(s) from stern of boat with long-handled dipper. Invert dipper and submerge to a depth of approximately 1 foot, or depth above sludge, if less than 1 foot of water is present; turn dipper upright, withdraw, and pour contents into one of the stainless steel buckets. The bucket should be marked with a quadrant designation (e.g., NE, SE, NW, SW). On-shore support personnel will record sample activities (method, time, and description) in a logbook.

11. Measure the depth of the sludge zone at the bottom of the pond. Push the sludge coliwasa into the sludge zone, rotate gently, and then slowly pull the coliwasa out of the water. Measure the length of the water and sludge in the coliwasa. The sludge portion of the sample in

the coliwasa will be placed into a pre-weighed sample container, sealed, and labeled according to the pond and quadrant. Record the weight of the empty container in the logbook. The container will be taken to shore with the other samples to subsequently be weighed to determine the weight of the sludge. On-shore support personnel should record the measurement and sampling activities (time, method, description).

12. Collect the sludge sample. Drop the open Eckman™ dredge through the water into the sludge zone. Activate the dredge by dropping the weight down the "taut" rope to release the cables and close the dredge. Lift the dredge out of the water in an upright position. Drain water off the sludge sample by closing the lid on the dredge and tilting the dredge along the edge of the boat. Release the sludge sample into a stainless steel bowl by pulling up on the cables. Reactivate the dredge in an "open" position by connecting the cable eyelet onto the peg at the top of the dredge. Transfer sludge from the stainless steel bowl into sample containers with a disposable plastic scoop. Repeat the procedure until sludge sample containers are filled. Rinse the outside of the sample containers, dredge and stainless steel bowl with distilled or tap water to remove "gross" contamination.

13. Return to shore. Sample personnel remove protective clothing at the direction of the EG&G RPT.

14. Support personnel in modified Level D personal protective equipment will wash the outside of each sample container with water and Alconox™ mixture and place each bottle into the third equipment rinse tub. Rinse the outside of each bottle and towel dry.

    RPT will perform alpha survey and smear each container to confirm effectiveness of radioactive decontamination. Fill in the time of sample collection and sampler's initials on the preprinted sample label using a permanent ink marking pen. Attach the sample label to the sample container and place clear tape over the sample label. Make sure the lids are secure and Halliburton NUS personnel will (as in Step 18) sign and attach a custody seal over the lid of each container. Place sample bottles into a Ziploc™ bag, seal the bag and place into a cooler to maintain custody.

15. Support personnel will decontaminate sampling equipment as per step 6 and decontaminate the outer (nitrile) gloves using the same procedure.

16. With a glass beaker, remove approximately 250 ml of water from each quadrant bucket and measure the pH and conductivity using the respective instruments. Provide a description of the water (e.g., turbidity, color, odor) and record the pH and conductivity measurements in the logbook.

17. Using a glass beaker, place water from each quadrant into the appropriate sample bottles. Repeat step 14.

18. After the last sample has been taken and the sampling equipment has been decontaminated as per the procedures in step 6, prepare the field equipment blanks. Fill two volatile organic sample bottles by pouring deionized water into the dipper and transfer to appropriate sample bottle. Leave the bottles open for a period of time equivalent to the period of time that the sampling device is exposed to the ambient environment between samples. Cap the bottles and ensure that there is no air inside the bottles by inverting and tapping the bottle. Decontaminate the bottles as per Step 14. Halliburton NUS personnel

will sign a custody seal and attach it around the lid of the sample bottle, but not covering the septa.

19. Support personnel will take the container that contain sludge from the coliwasa (see step 11) to building 788 to be weighed. Record the weight of each container in the logbook. Return to the appropriate pond and dump the sludge from the containers into the pond. Return to sampling area with container.

20. After all samples have been collected and the sampling equipment has been decontaminated per the procedures indicated in Step 6, signal to the RPT to collect smears on all equipment to confirm the effectiveness of radioactive decontamination.

21. Dump equipment wash and rinse solutions into the pond that was sampled, or if sampling is not completed, into a 5-gallon wastewater container using a funnel. Pour clean tap water into each decontamination tub and swirl to contact all surfaces. Pour the rinse water into the pond or 5-gallon wastewater container. Dry each container with towels or wipes.

    The RPT will smear the surface of the sampling and decontamination equipment. Equipment that exhibits <20 dpm of contamination can be removed from Building 788 (as determined by the RPT). Equipment that exhibits >20 dpm of contamination, as specified in ROI 3.1, will be wiped with a damp wipe, resmeared, counted and rewiped until the levels of removable contamination are <20 dpm.

22. Place all contaminated disposable sampling and decontamination equipment into a clear plastic trash bag (provided by EG&G). This would include polyethylene sheeting; brushes, if not reusable; wipes; and contaminated outer gloves. One person will remain in protective clothing, and fold the polyethylene sheeting to a size that will fit into the solid waste plastic trash bag. Seal the bag with tape, label the contents as solar pond sampling waste, and date the label. Bagged solid wastes will be crated and managed by EG&G waste operations personnel.

23. Halliburton NUS personnel will (as in Step 18) complete all information on the custody forms. Pack those samples requiring preservation by cooling into the refrigerator located in Building 788. Place the remaining samples in a secure location in Building 788 to maintain chain of custody. Place custody seals across openings of refrigerator and any coolers holding samples. Forms remain with the sample custodian.

24. Proceed to showers and change into street clothes.

B. Procedure for Sample Collection, Packaging and Shipment of Sludge Characterization Samples from Solar Pond 207C:

For Pond 207C sludge only. Preliminary data suggests that Pond 207C sludge meets the DOT definition of radioactive material (>2nCi/g); therefore, the samples will be packaged in accordance with the DOT requirements for transport of radioactive materials, specifically RADIOACTIVE, LOW-SPECIFIC ACTIVITY N.O.S.

1. **Radioactive Material Low Specific Activity, N.O.S.** Screening data (for total alpha and total beta) on Pond 207C sludge indicates that the sludge meets the DOT definition of "Low Specific Activity" material listed in 49 CFR § 173.403(n)(4)(i). As such, the sludge required for treatability study and characterization will be packaged in accordance with the requirements for RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, N.O.S. The DOT regulations provide an exception to specification packaging, marking and labeling if the conditions specified in 49 CFR § 173.425(b) are met.

2. Prepare sample labels for trip blanks and attach to sample bottles. A 40 ml glass bottle is used for VOA analysis. If trip blank is not pre-prepared, completely fill the bottle with deionized water such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle and ensure that there are no air bubbles in the bottle after it is inverted and tapped. Sign a custody seal and place it around the lid of the bottle, but do not cover the septa. Place the bottles in the sample cooler with frozen gel packs.

   Dress in EG&G provided undergarments and coveralls. Conduct pre-evolution brief. Move equipment to the staging area, including:

   Monitoring instruments
   Personnel protective equipment
   Sampling equipment
   Decontamination equipment
   Sample coolers

3. Lay two thicknesses of polyethylene sheeting on the ground or on top of the berm near the sampling area. The sheeting should measure approximately 10 feet x 10 feet. Place all tools and equipment on the sheeting to prevent contact with the ground or berm.

   The sampling equipment decontamination area will consist of two wash tubs and three rinse tubs. The first station (wash) will consist of two plastic wash tubs that contain approximately 1/4 cup of detergent dissolved in approximately 2 liters of deionized water. Place a soft-bristled bottle brush into the detergent solution in each tub.

   Each of the next three stations will be sequential rinse stations that consist of a plastic wash tub filled with approximately 1 liter each of deionized water. A bottle brush or sponge will be dedicated to each of the three rinse stations.

4. Place the following items on two layers of polyethylene ground sheeting at the staging area:

   Sludge scoop or teflon dipper
   Coliwasa
   Long-handled rake

Sample containers (per Table 3)
Stainless steel buckets

Don modified Level D personal protective equipment as prescribed in the health and safety plan.

5. Place the sampling device (i.e. sludge scoop) into the wash tub (first station) and scrub inside and outside surfaces with a bottle brush. After washing, place the sampling device into the first rinse tub and remove all residual soap using another bottle brush. Repeat this procedure for the remaining two rinse stations. Shake excess water from the equipment after the final rinse. Measure the cross-sectional area of the coliwasa.

6. Place sampling device (i.e. sludge scoop), pressure sprayer with deionized water, paper towels, coliwasa, rake, and sludge sample collection bottles or stainless steel buckets in boat. Conduct radio check. Personnel assigned to sample collection of water and sludge will don personal protective equipment as prescribed in the health and safety plan, and enter the boat, using a rope and safety harness. See Procedure II A, Step 8 for heat stress precautions.

7. Personnel on shore will guide the boat to the center point of the pond quadrant by aligning boat with the stakes on opposite shores. After the center of the quadrant has been reached, the boat position will be maintained by on-shore support personnel using the safety lines.

8. Collect the sludge sample. Using the long-handled rake, loosen sludge in the area. Insert the sludge scoop through the water until it contacts the sludge zone. Slowly pull the scoop through the sludge. Lift the scoop out of the water. Decant the water off the sludge by tilting the scoop and transfer the sample into the sample container or stainless steel bucket. Rinse the inside and outside of the scoop with deionized water using the pressure sprayer.

   Measure the depth of the sludge zone at the bottom of the pond. Push the sludge coliwasa into the sludge zone, rotate gently, and then slowly pull the coliwasa out of the water. Measure the length of the water and sludge in the coliwasa. The sludge portion of the sample in the coliwasa will be placed into a sample container. The container will be sealed and labeled according to the pond and quadrant. The container will be taken to shore with the other samples to subsequently be weighed to determine the weight of the sludge. NOTE: The coliwasa may not easily be inserted into the sludge. If a sample cannot be collected with the coliwasa, then make a note that difficulties were encountered in the log book. On-shore support personnel should record the measurements and sampling activities (time, method, description).

9. Repeat steps 7 and 8 for the remaining three quadrants. Take appropriate health and safety breaks prescribed by the EG&G Industrial Hygienist. Return to shore.

10. After returning to shore with the individual grab samples of Pond 207C sludge, support personnel, in prescribed personal protective equipment, will transfer the appropriate quantity of sludge from the stainless steel buckets to the appropriate sample containers, using a plastic scoop.

11. Follow steps 14, 15, and 18 through 24 under Procedure II A **"Procedures for the collection of sludge and water samples from Solar Ponds 207A; 207BN, BC, BS; and water from 207C."**

12. Review Tables 6 and 7 for package configuration for Pond 207C samples.

13. Place the 4 ounce sample containers into 1/2 gallon paint cans (one sample per can). Place the 32 ounce sample containers into 1 gallon paint cans (one sample per can). Surround the sample container with absorbent material (i.e. absorbent material). Secure the lids of the paint cans to the paint cans by tapping with a rubber mallet.

14. EG&G personnel will conduct an inspection of a 55 gallon DOT 17C removable head drum according to the procedures presented in ATTACHMENT 6 of this SOP.

15. Place an EG&G drum liner into a 55 gallon DOT 17C removable head drum. Place a layer of absorbent material 6 to 8 inches in depth into the bottom of the drum and liner. Place the paint cans containing the samples into the drum and separate layers of paint cans with absorbent material. Ensure that the total alpha activity in each drum does not exceed 0.002Ci (A_2 value for PU^{238}) (Title 49 CFR §173.435). Secure the drum liner with a pig-tail closure using yellow tape. When the drum is full, place the drum cover on and secure the locking ring to the drum according to the procedures presented in ATTACHMENT 6 of this SOP.

16. Halliburton NUS personnel will sign a chain-of-custody sticker and place on the locking bolt. Affix a label on the outside of the drum that reads "RADIOACTIVE - LSA". Affix an EG&G address label that indicates the consignor name and address on the side of each drum.

17. Arrange the drums symmetrically on a wooden 48" x 48" pallet. Place cardboard corners on the top sides of the drums. Band the drums to the pallet as directed by an EG&G Traffic Department Representative. Weigh and measure each pallet on the scale in Building 788.

18. Complete one RF-46404, Radioactive Shipment Preparation Certification form for each pallet (lot) of drums. An RPT will need to assist the preparer in the completion of the form.

19. Complete RF-24320, Shipping Memo form by typing the required information on the form. The Shipping Memo will be completed for each lab destination. An approved example of a completed Shipping Memo is presented as Attachment 4.

20. Place a Material Transfer Tag (MTT) on the pallet, and have the RPT survey the contents of the pallet and sign the Material Transfer Tag. A copy of the MTT will accompany the Shipping Memo to the Traffic Department. Contact Transportation Security at extension 3313 to schedule transportation of the pallets to Building 130 warehouse. The MTT remains with the samples for transportation.

21. Hand carry the completed Shipping Memo form(s) (RF-24320), a copy of the MTT and the Radioactive Shipment Preparation Certification forms (RF-46404), if applicable, to the Traffic Department located on the second floor of Building 111.

22. Have a Traffic Department representative review the Shipping Memo and, if applicable, Radioactive Shipment Preparation Certification forms. If complete, leave the forms with the Traffic Department representative.

C. Procedure for Packaging and Shipment of Sludge and Water Characterization Samples From Solar Ponds 207A; 207BN, BC, BS; and water only from 207C:

1. Samples that contain less than 2 nCi/g total alpha plus total beta, as determined by screening performed by EG&G laboratories, will be shipped as "Environmental Samples" or "ORM-E" depending upon review of recent characterization data provided by Weston Analytics. Refer to DOT 49 CFR Part 173, Subpart O and EG&G "On-Site Transportation Manual" - January, 1991. See Tables 6 and 7 for DOT Hazard Class designation and package configuration.

ENVIRONMENTAL SAMPLES

Place all laboratory samples into Ziploc™ polyethylene bags. Place the volatile organic and alcohol samples into 1/2 gallon paint cans and sludge sample containers into 1 gallon paint cans. Surround the sample completely with absorbent material. Seal the lid on the top of the paint can by tapping with rubber mallet. Fill out a chain of custody sticker and apply it to the lid of the paint can. The larger volume samples placed in containers indicated in Tables 2 and 3, will be double bagged using polyethylene bags, and the closure taped. Place the larger volume containers and the 1/2 and 1 gallon paint cans into coolers and surround with absorbent material. Verify that each container has a chain-of-custody seal.

Review the chain-of-custody to confirm that all samples listed on the chain-of-custody are accounted for in the cooler. Write the Shipping Memo number on the chain-of-custody form. Place the chain-of-custody and a copy of the radiation screening results in a sealable polyethylene bag and tape the bag to the inside of the lid of the cooler. Place frozen gel packs on top of the paint cans. Pour absorbent material on and around the paint cans inside the cooler to act as cushion and absorbent. Close the lid of the cooler and seal the cooler with 2-inch, reinforced packing tape. Place an EG&G address label that indicates the consignor name and address on the cooler, and cover the label with clear sealing tape. Place another label on the cooler that states "Environmental Samples". Place another "up arrow" on one side of the cooler. If an up arrow is on more than one side of the cooler, then all sides must display an up arrow.

ORM-E SAMPLES

An Other Regulated Material (ORM) is a material that: (1) may pose an unreasonable risk to health and safety or property when transported in commerce; and (2) does not meet any of the definitions of the other hazard classes; or (3) has been reclassed an ORM (specifically or permissively) per 49 CFR 173.500. The ORM-E is a material that is not included in any other hazard class, but is subject to the requirements of the regulations. Materials in this class include: a) hazardous waste; b) hazardous substances as defined in 49 CFR 171.8. Further details on ORM and other Hazard Class Definitions are included in the EG&G Traffic Department "On-Site Transportation Manual" (January 1991).

Place volatile organic, alcohol and sludge samples into Ziploc™ polyethylene bags and into 1/2 gallon or 1 gallon paint cans as detailed in Table 7. Surround the sample completely with an absorbent material such as absorbent material. Seal the lid on the top of the paint can by tapping with a rubber

mallet. Fill out a chain-of-custody sticker and apply it to the lid of the paint can.

Large volume samples for semi-volatiles, cyanide, metals, etc., will be placed in DOT 5B or 6C removable head drums. Inspect the drums as detailed in ATTACHMENT 6. Line bottom of the drum with 2 foam discs, place sample container in a polyethylene bag and tape the closure. Place the sample in the drum and surround with an absorbent material such as absorbent material. Place gel packs around and on top of the sample. Place 3 foam discs over the top of the sample container and close the drums according to procedures in ATTACHMENT 6 of this SOP. Sign and place a chain-of-custody sticker on the locking bolt.

Inspect a 55 gallon DOT 17C open head drum as detailed in ATTACHMENT 6. Line the bottom of the drum with 6 to 8 inches of an absorbent material. Place the paint cans containing the samples into the drum and surround with an absorbent material, and gel packs. Separate layers of paint cans with absorbent material. Continue until the drum is full.

1. Review the chain-of-custody to confirm that all samples listed on the chain-of-custody are accounted for in the drums. Mark the Shipping Memo number on the chain-of-custody. Place the chain-of-custody in a sealable polyethylene bag and tape the bag to the inside lid of one of the drums in the shipment. Close the drum according to procedures in ATTACHMENT 6. Sign and place a chain-of-custody sticker on the locking bolt. Affix a label or mark the drum to indicate it contains the chain-of-custody. Affix an EG&G address label that indicates the consignor name and address below the locking bolt and on the opposite side of the drum. Affix a second label on each drum that states "ORM-E". An additional label is required that includes the proper shipping name and UN/NA number. The proper shipping name will be determined upon review of recent waste characterization sampling results. Indicate on the address label the number of drums in the shipment.

2. Follow steps 19-22 under Procedure II B - **"Procedure for Sample Collection, Packaging and Shipment of Samples from Solar Pond 207C".**

D. Solar Pond Sludge and Water Samples and Analytical Waste Disposition:

Remaining solar pond samples not used for analysis, and all analytical solutions and solid specimens generated during the analytical procedures, will be segregated from all other analytical wastes being generated in the laboratory and returned to EG&G Rocky Flats, Inc. Rocky Flats Plant, Rocky Flats, Colorado, 80403, by the laboratory except as noted below. Every effort should be made to minimize the quantities of analytical waste that will have to be returned to RFP. Return shipments shall fully comply with the requirements of Title 49 CFR. The laboratory will consult with and provide photocopies of shipping papers to the RFP Traffic Department, and obtain authorization through the RFP Traffic Department for return shipment of material to the RFP.

E. Procedure for Collection of Sludge and Water Characterization Samples from the Clarifier Tank:

1. Dress in EG&G provided undergarments, and coveralls. Conduct pre-evolution health & safety brief. Mobilize to Building 788.

2. Prepare sample labels for trip blanks and attach to sample bottles. A 40 ml glass bottle is used for VOA analysis. Completely fill the bottle with deionized water such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle and ensure that there are no air bubbles in the bottle by inverting and tapping the bottle. Sign a custody seal and place it around the lid of the bottle, but do not cover the septa. Place the bottles in the sample cooler with frozen gel packs.

3. Organize the sample bottles according to the schedule presented in Tables 4 and 5 of this procedure. Move equipment to staging area on the south side of the clarifier building, including:

   Monitoring instruments
   Personal protective equipment
   Sampling equipment
   Decontamination equipment
   Sample coolers

4. Lay two thicknesses of polyethylene sheeting on the ground south of the clarifier building. The sheeting should measure approximately 10 feet x 10 feet. Place all tools and equipment on the sheeting to prevent contact with the ground or berm.

   The sampling equipment decontamination area will consist of two wash tubs and three rinse tubs. The wash station will consist of a plastic wash tub that contains approximately 1/4 cup of detergent dissolved in approximately 2 liters of deionized water. Place a soft-bristled bottle brush into the detergent solution in each tub.

   Each of the next three stations will be sequential rinse stations that consist of a plastic wash tub filled with approximately 1 liter each of deionized water. A bottle brush or sponge will be dedicated to each of the three rinse stations.

5. Place the following sampling equipment on the polyethylene sheeting near the first decontamination station:

   Dredge
   Bailer or dipper
   Sample containers (per Tables 4 and 5)
   Stainless steel bowl
   Squeeze bottle or pressure sprayer with deionized water
   Measuring rod or tape
   Polyethylene rope (1/4")

   Don modified Level D personal protective equipment as prescribed in the health and safety plan.

   Disassemble the dredge. Place each of the parts of the dredge sampler into the wash tub (first station) and scrub inside and outside surfaces with a bottle brush. After washing, place the parts into the first rinse tub and remove all residual soap using another bottle brush.

Repeat this procedure for the remaining two rinse stations. Shake excess water from the equipment after the final rinse and reassemble the dredge sampler. Repeat this procedure with the dipper sampler, stainless steel buckets and bowls, and measuring rod. Place the dipper in a Ziploc™ bag, the dredge in a clean bucket and the bailer in a trash bag or wrap in foil. Discard the wash and rinse solution as necessary to maintain its effectiveness by dumping the wastewater back into the clarifier.

6. Set up hoist system for movement of sampling equipment and samples to the bridge on top of the clarifier tank. EG&G Industrial Safety and/or H&S will conduct inspection, any required testing (i.e., load tests) and approve hoist system and location prior to operation of the system.

7. Place water sampling equipment — bailer, rope, plastic tub for spillage, and required bottles (see Tables 4 and 5) into hoist cart. Hoist materials to bridge area, proceed to the bridge, and don personal protective equipment as prescribed in the health and safety plan. See Procedure II A, Step 8 for heat stress precautions.

8. Personnel on the bridge will proceed with set-up for water sampling. Sample containers will be placed in the plastic tub to catch spillage. The rope will be attached to the bailer, and the free end attached to the railing to allow retrieval of the bailer if dropped into the tank.

9. Personnel on the bridge will conduct radio check and, if required, don respirators. Lower the bailer at designated sample locations (total 3 sample locations), to desired depth. When the bailer is filled, pull bailer to the bridge and collect grab volatile organic water sample using bottom fill valve. Place plastic tub beneath filling operation to collect spillage. Make sure the VOA vial is filled to the brim so that no air bubbles are contained in the bottle after the bottle is inverted and tapped. Wipe sample containers with paper towels and place them in available container to protect from breakage. Support personnel will record in a logbook the method of collection, time of collection, and sampling personnel.

10. Proceed with water sample collection using the bailer until the sample containers are filled. Use plastic tub to contain spillage from filling operation.

11. Transfer filled sample containers using the hoist system to personnel on the ground. Personnel on the ground will provide sampling crew with sample containers for the other sample points.

12. Support personnel will conduct water quality measurements. With a glass beaker remove approximately 250 ml of water from each sample point and measure the pH and conductivity using the respective instruments. Provide a description of the water (e.g., turbidity, color, odor) and record the pH and conductivity measurements in the logbook.

13. Wash the outside of each water sample bottle with water and Alconox™ mixture. Rinse the outside of each bottle and towel dry. An EG&G RPT will survey and smear each container to confirm effectiveness of radioactive decontamination. Fill in the time of sample collection and sampler's initials on the preprinted sample label using a permanent ink marking pen. Attach the sample label to the sample container and place clear tape over the sample label. Make sure the lids are secure and Halliburton NUS personnel will sign and attach a custody seal over the

lid of each container. Place sample bottles into a Ziploc™ bag, seal the bag and place into a cooler to maintain custody.

14. Repeat steps 9-14 for each sample location.

15. Lower all water sampling equipment to support personnel using hoist.

16. Hoist sludge sampling equipment to bridge, including dredge, rope, and sample containers. Repeat steps 9-11 (except VOA sample collection) and step 13 for sludge sampling. Substitute dredge for bailer and sludge for water.

17. After the last sample has been taken, dump accumulated material in the spillage containment tub into the clarifier. Repeat step 15.

18. After the last sample has been taken and the sampling equipment has been decontaminated as per the Procedures in step 5, prepare the field equipment blanks. Fill two prepreserved volatile organic sample bottles by pouring deionized water through the bailer and transfer into appropriate sample bottle. Leave the bottles open for a period of time equivalent to the period of time that the sampling device is exposed to the ambient environment between samples. Cap the bottles and ensure that there is no air inside the bottles by inverting and tapping the bottle. Decontaminate the bottles in the same manner as the pond samples. Sign a custody seal and attach it around the lid of the sample bottle, but not covering the septa.

19. After all samples have been collected and the sampling equipment has been decontaminated per the Procedures indicated in Step 5, signal to the RPT to collect smears on all equipment to confirm the effectiveness of radioactive decontamination.

20. Dump equipment wash and rinse solutions into the clarifier or if sampling is not completed, into a 5-gallon wastewater container using a funnel. Pour clean tap water into each decontamination tub and swirl to contact all surfaces. Pour the rinse water into the clarifier. Dry each container with towels or wipes.

    The RPT will smear the surface of the sampling and decontamination equipment. Equipment that exhibits <20 dpm of contamination can be removed from Building 788 (as determined by the RPT). Equipment that exhibits >20 dpm of contamination, as specified in ROI 3.1, will be wiped with a damp wipe, resmeared, counted and rewiped until the levels of removable contamination are <20 dpm.

21. Place all contaminated disposable sampling and decontamination equipment into a clear plastic trash bag (provided by EG&G). This would include polyethylene sheeting; brushes, if not reusable; wipes; and contaminated outer gloves. One person will remain in protective clothing, and fold the polyethylene sheeting to a size that will fit into the solid waste plastic trash bag. Seal the bag with tape, label the contents as solar pond sampling waste, and date the label. Bagged solid wastes will be crated and managed by EG&G Waste Operations personnel.

22. Complete all information on the custody forms. Pack those samples requiring preservation by cooling into the refrigerator located in Building 788. Place the remaining samples in a secure location in Building 788 to maintain chain of custody. Place custody seals across openings of refrigerator and any coolers holding samples. Forms remain with the sample custodian.

F. Procedure for Packaging Clarifier Water and Sludge Characterization Samples:

Based on radiological screening data obtained by EG&G Laboratories, clarifier sludge samples will be packaged and shipped as RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, N.O.S. The procedure for packaging the samples will be as described in steps 13-22 of Procedure II, B, **"Procedure for Packaging and Shipment of Sludge and Water Characterization Samples from Solar Pond 207C."**

The clarifier water samples will be shipped as "Environmental." The environmental samples will be packaged as described in Procedure II, C, **"Procedure for Packaging and Shipment of Sludge and Water Characterization Samples from Solar Ponds."**

G. Procedure for Collection of Treatability Study Sample Volumes of Sludge and Water Samples from Solar Ponds 207A; 207BN, BC, BS; and water from 207C:

1. Dress in EG&G provided undergarments, and coveralls. Conduct pre-evolution health & safety brief. Mobilize to Building 788. Set up the staging area on the south side of the clarifier building (southeast side of Building 788). Lay polyethylene sheeting on the ground. Place all tools (i.e., dredge, ropes, buckets), drums and equipment on the sheeting to prevent contact with the ground or berm. Set up appropriate drums inspected as per ATTACHMENT 6 and the open-top tank on level ground. Identify drums by media type, (i.e., water and sludge).

2. Lay two thicknesses of polyethylene sheeting on the ground or on top of the berm near the sampling area. The sheeting should measure approximately 10 feet x 10 feet. Place all tools and equipment on the sheeting to prevent contact with the ground or berm.

   The sampling equipment decontamination area will consist of two wash tubs and three rinse tubs. The first station (wash) will consist of two plastic wash tubs that contain approximately 1/4 cup of detergent dissolved in approximately 2 liters of deionized water. Place a soft-bristled bottle brush into the detergent solution in each tub.

   Each of the next three stations will be sequential rinse stations that consist of a plastic wash tub filled with approximately 1 liter each of deionized water. A bottle brush or sponge will be dedicated to each of the three rinse stations.

3. Place the following items on two layers of polyethylene ground sheeting at the staging area:

   Ponar™ Dredge
   Stainless steel scoop
   Glass funnel
   Stainless steel buckets (12)

   Don modified Level D personal protective equipment as prescribed in the health and safety plan. See Procedure II A Step 8 for heat stress precautions.

4. Disassemble the Ponar™ Dredge and place it into the wash tub (first station) and scrub inside and outside surfaces with a bottle brush. After washing, place the parts into the first rinse tub and remove all residual soap using another bottle brush. Repeat this procedure for the remaining two rinse stations. Shake excess water from the equipment after the final rinse. Repeat this procedure for other equipment. Decontaminate the open top tank with pressure sprayer and brushes.

5. Set-up appropriate drums inspected as per ATTACHMENT 6, and an open-top tank on level ground at the top of the berm. Identify and section drums by quadrant (SW, NW, SE, and NE). Refer to Tables 6 and 8 for drum size and type. Quadrant grab samples for treatability study and storage will be transferred into 15-gallon drums. The composite samples will be composed of 16 gallons of water from each quadrant mixed in an open top tank and transferred into the 55-gallon drums for packaging and shipment.

6. Drums should be spaced to allow closure and movement of drum with easy and safe access.

7. a. Mark the interior of each drum to indicate the required volume for sample collection, composite, or grab. The 55-gallon composite drums will be marked to indicate 30 and 32 gallons. The 15-gallon grab sample drums will be marked for 10 and 12 gallons.

   b. Mark the open-top tank to indicate 16, 32, 48 and 64 gallons for composite sample.

8. Prepare sample labels for trip blanks and attach to sample bottles. A 40 ml glass bottle is used for VOA analysis. Completely fill the bottle with deionized water such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle and ensure that there are no air bubbles in the bottle by inverting and tapping the bottle. Sign a custody seal and place it around the lid of the bottle, but do not cover the septa. Place the bottles in the sample cooler with frozen gel packs.

9. Personnel assigned to sample collection of water and sludge will don personal protective equipment, as prescribed in the health and safety plan. Perform radio check and enter the boat using a rope and safety harness with sampling equipment and sample containers. See Procedure II A, Step 8 for heat stress precautions.

10. Using safety lines, personnel on shore will pull boat to the first quadrant (closest quadrant to sampling area). Locate center of quadrant with the assistance of personnel, aligning boat to stakes on shore. The boat position will be maintained by on-shore support personnel using the safety lines.

11. Using winch, lower bucket into the pond, filling the bucket approximately 3/4 full.

12. Retrieve bucket using winch. Take bucket off winch and replace with new bucket. Continue to fill buckets with water until appropriate volume is collected from sampling location.

13. Remove bucket from winch and replace with Ponar™ Dredge for sludge collection.

14. Collect sludge sample by lowering the Ponar™ Dredge with the winch. The dredge will automatically close when it strikes the bottom of the pond.

15. Use the winch to retrieve the dredge. Place contents of dredge into buckets.

16. Fill each bucket approximately 3/4 full. Personnel on shore will record time and method of sample collection and sampling.

17. Repeat steps 14 to 16 until appropriate volume of sludge is collected from sampling location.

18. At the completion of sampling each quadrant, shore personnel will use the safety lines to bring the boat to shore.

19. Sample personnel will hand each bucket to shore personnel for transfer up berm to drums. Empty decontaminated buckets will be put on the boat.

20. Shore personnel will move and position the boat at the center of next quadrant.

21. Transfer sludge and water from the buckets to appropriate drums and composite container (open top tank). Repeat decontamination of buckets as described in Step 4.

22. Properly close all storage and treatability drums (i.e., threaded plug or locking ring) as per ATTACHMENT 6.

23. Repeat steps 11 to 22 for remaining three quadrants, filling tank to next indicating mark for each quadrant.

24. Thoroughly mix the contents of the open tank to form a composite sample.

25. Organize sample bottles for characterization of composite sample according to schedule in Tables 2 and 3.

26. Fill sample containers with sludge from composited sample. Use a stainless scoop to transfer the sample.

27. Fill sample containers with water from composited sample. Use bucket and glass funnel to transfer the sample. Ensure no air bubbles are present in VOA samples, by inverting and tapping bottle.

28. Support personnel in modified Level D personal protective equipment will wash the outside of each sample bottle with water and Alconox™ mixture and place each bottle into the third equipment rinse tub. Rinse the outside of each bottle and towel dry.

    RPT will perform alpha survey and smear each container to confirm effectiveness of radioactive decontamination. Fill in the time of sample collection and sampler's initials on the preprinted sample label using a permanent ink marking pen. Attach the sample label to the sample container and place clear tape over the sample label. Make sure the lids are secure and sign and attach a custody seal over the lid of each container. Place sample bottles into a Ziploc™ bag, seal the bag and place into a cooler to maintain custody.

29. Using buckets, transfer composite sample from composite tank to the 55-gallon drums. Fill each drum to the indicated marks, 32 and 30 gallons.

30. Properly close all storage and treatability drums (i.e., threaded plug or locking ring) as per ATTACHMENT 6. Decontaminate the exterior of the drum with water. Use paper towels to dry the drum. Label the lid and side of the drum with sample identification number, and affix a sample ID label to the drum. Sign and attach chain-of-custody seal across threaded plug or on the bolt of the locking ring.

31. After the last treatability study volume has been collected, verify drums are labeled and chain-of-custody seals are attached. An EG&G RPT will survey and smear each container to confirm effectiveness of radioactive decontamination.

32. With a fork lift and drum sling, place drums on wooden pallets. Band the drums on the pallet with banding machine. Load the pallet on a stake truck for transport to Building 788.

33. Discharge excess water or sludge in the open tank to the pond. Use the pressure sprayers to decontaminate the open top tank.

34. Dump equipment wash and rinse solutions into the pond that was sampled, or if sampling is not completed, into a 5-gallon wastewater container using a funnel. Pour clean tap water into each decontamination tub and swirl to contact all surfaces. Pour the rinse water into the pond or 5-gallon wastewater container. Dry each container with towels or wipes.

    An RPT will smear the surface of the sampling and decontamination equipment. Equipment that exhibits <20 dpm of contamination can be removed from Building 788 (as determined by the RPT). Equipment that exhibits >20 dpm of contamination, as specified in ROI 3.1, will be wiped with a damp wipe, resmeared, counted and rewiped until the levels of removable contamination are <20 dpm.

35. Place all contaminated disposable sampling and decontamination equipment into a clear plastic trash bag (provided by EG&G). This would include polyethylene sheeting; brushed, if not reusable; wipes; and contaminated outer gloves. One person will remain in protective clothing, and fold the polyethylene sheeting to a size that will fit into the solid waste plastic trash bag. Seal the bag with tape, label the contents as solar pond sampling waste, and date the label. Bagged solid wastes will be crated and managed by EG&G waste operations personnel.

36. Complete all information on the custody forms. Properly store the treatability samples in Building 788 until packaging and transport. Forms remain with the sample custodian. Packaging procedures are outlined in Procedure II, J. "Procedure for Packaging Sample Volumes for Treatability Study".

37. Packaging and shipping of waste characterization composite samples for sludge and water from Ponds 207A, 207BN, BC, BS, and water only 207C will be conducted as specified in Section II B and C of this SOP.

H. Procedure for Collection of Treatability Study Sample Volumes of Water and Sludge from the Clarifier:

1. Dress in EG&G provided undergarments, and coveralls. Conduct pre-evolution health & safety brief. Mobilize to Building 788.

2. Set up the staging area on the south side of the clarifier building (southeast side of Building 788). Lay polyethylene sheeting on the ground. Place all tools (i.e., dredge, ropes, buckets), drums and equipment on the sheeting to prevent contact with the ground or berm.

3. Set up appropriate drums inspected as per ATTACHMENT 6 and the open-top tank on level ground. Identify drums by media type, (i.e., water and sludge).

4. Prepare sample labels for trip blanks and attach to sample bottles. A 40 ml glass bottle is used for VOA analysis. Completely fill the bottle with deionized water such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle and ensure that there are no air bubbles in the bottle by inverting and tapping the bottle. Sign a custody seal and place it around the lid of the bottle, but do not cover the septa. Place the bottles in the sample cooler with frozen gel packs.

5. Lay two thicknesses of polyethylene sheeting on the ground south of the clarifier building. The sheeting should measure approximately 10 feet x 10 feet. Place all tools and equipment on the sheeting to prevent contact with the ground or berm.

   The sampling equipment decontamination area will consist of two wash tubs and three rinse tubs. The wash station will consist of a plastic wash tub that contains approximately 1/4 cup of detergent dissolved in approximately 2 liters of deionized water. Place a soft-bristled bottle brush into the detergent solution in each tub.

   Each of the next three stations will be sequential rinse stations that consist of a plastic wash tub filled with approximately 1 liter each of deionized water. A bottle brush or sponge will be dedicated to each of the three rinse stations.

6. Place the following sampling equipment on the polyethylene sheeting near the fist decontamination station:

   Dredge
   Stainless steel buckets
   Sample containers (per Tables 4 and 5)
   Squeeze bottle or pressure sprayer with deionized water
   Measuring rod or tape
   Polyethylene rope (1/4")

   Don personal protective equipment as prescribed in the health and safety plan. See Procedure II A, Step 8 for heat stress precautions.

   Disassemble the dredge. Place each of the parts of the dredge sampler into the wash tub (first station) and scrub inside and outside surfaces with a bottle brush. After washing, place the parts into the first rinse tub and remove all residual soap using another bottle brush. Repeat this procedure for the remaining two rinse stations. Shake excess water from the equipment after the final rinse and reassemble

the dredge sampler. Repeat this procedure with the stainless steel buckets, bowls, and measuring rod. Place the dredge in a clean bucket and the bailer in a trash bag or wrap in foil. Discard the wash and rinse solution as necessary to maintain its effectiveness by dumping the wastewater into the clarifier. Decontaminate the open top tanks.

7. Set up hoist system for movement of sampling equipment and samples to the bridge on top of the clarifier tank. EG&G Industrial Safety and/or H&S will conduct inspection, any required testing (i.e., load tests) and approve hoist system and location prior to operation of the system.

8. Place water sampling equipment - stainless steel buckets, rope, and plastic tub for spillage, into hoist cart. Hoist materials to bridge area. Personnel assigned to the sampling operation will don personal protective equipment as prescribed in the health and safety plan (except respirators, if required) then proceed to the bridge.

9. Personnel on the bridge will proceed with set-up for water sampling. Sample containers will be placed in the plastic tub to catch spillage. The rope will be attached to the bucket, and the free end attached to the railing to allow retrieval of the bucket if dropped into the tank.

10. Personnel on the bridge will conduct radio check and, if required, don respirators. Lower the bucket at designated sample locations (total 3 sample locations), the desired depth. When the bucket is filled, pull bucket to the bridge. Place plastic tub beneath filling operation to collect spillage and then begin filling containers. Support personnel will record in a logbook the method of collection, time of collection, and sampling personnel.

11. Proceed with water sample collection until the appropriate volume is collected for sample location. Use plastic tub to contain spillage from filling operation.

12. Transfer filled sample containers using the hoist system to personnel on the ground. Personnel on the ground will provide sampling crew with sample containers for the other sample points.

13. Personnel on the ground will fill each drum to the appropriate level for each location. Twelve gallons of sludge and water will be collected from each sampling location. Support personnel will record time and method of sample collection, sampling personnel and description of the sample.

14. Repeat steps 10 to 13 for each sample location.

15. Lower all water sampling equipment to support personnel using hoist.

16. Thoroughly mix the contents of the tanks to form the composite sample.

17. Organize water characterization sample bottles for characterization of composite sample according to schedule in Tables 4 and 5. Fill sample containers with appropriate media for composite sample. Ensure that no air bubbles are present in VOA samples, by inverting and tapping the bottle.

18. Hoist sludge sampling equipment to bridge, including dredge, rope, and sample containers. Repeat steps 10-14 and 16-17 for sludge sampling. Substitute dredge for stainless steel bucket and sludge for water.

19. Place 16 gallons of each media into appropriate containers for shipment to Halliburton NUS to conduct treatability samples. Retain remaining portion of sample (18 gallons) for storage at the Rocky Flats facility.

20. Ater collection of all samples dump accumulated material in the spillage containment tub into the clarifier. Repeat step 15.

21. After all samples have been collected and the sampling equipment has been decontaminated per the procedures indicated in Step 6, signal to the RPT to collect smears on all equipment to confirm the effectiveness of radioactive decontamination.

22. Support personnel in modified Level D personal protective equipment will wash the outside of each sample bottle with water and Alconox™ mixture and place each bottle into the third equipment rinse tub. Rinse the outside of each bottle and towel dry.

    RPT will perform alpha survey and smear each container to confirm effectiveness of radioactive decontamination. Fill in the time of sample collection and sampler's initials on the preprinted sample label using a permanent ink marking pen. Attach the sample label to the sample container and place clear tape over the sample label. Make sure the lids are secure and sign and attach a custody seal over the lid of each container. Place sample bottles into a Ziploc™ bag, seal the bag and place into a cooler to maintain custody.

23. Properly close all storage and treatability drums (i.e., threaded plug or locking ring) as per ATTACHMENT 6.

24. Decontaminate the exterior of the drums with water. Use towels to wipe down the drum.

25. Label the lid and the side of the drums with the sample identification number and affix a sample ID label to the drum. Sign and attach a chain-of-custody seal across the threaded plug or on the bolt of locking ring.

26. Repeat steps 32 to 37 Procedure II, G, **"Procedure for Collection of Treatability Study Sample Volumes of Solar Pond Water and Sludge".**

    Note: Equipment wash and rinse solutions will be returned to the clarifier.

27. Packaging of composite samples for characterization will be according to Procedure II, F, **"Procedure for Packaging Clarifier Water and Sludge Characterization Samples".**

I. Procedure for Sample Collection of Treatability Sludge Samples from Solar Pond 207C:

1. The pumps and mixer assemblies in the center section of the Lagoon Pumper should be removed prior to sampling. This will be conducted by EG&G maintenance personnel. The procedure for removal is pending. If this cannot be done, then a platform will need to be constructed and attached to a pontoon to create a working surface.

2. Dress in EG&G provided undergarments, and coveralls. Conduct pre-evolution health & safety brief. Mobilize to Building 788.

3. Follow steps 2-5 in Procedure II, B, "**Procedure for Sample Collection Packaging and Shipment of Sludge Characterization Samples from Solar Pond 207C**". Additional equipment will include plastic pails.

4. Set-up appropriate drums inspected per ATTACHMENT 6 and an open-top tank on level ground at the top of the berm. Identify and section drums by quadrant (SW, NW, SE, and NE). Refer to Tables 6 and 8 for drum size and type. Decontaminate the open top tank.

5. Drums should be spaced to allow closure and movement of drum with easy and safe access.

6. a. Mark the interior of each drum to indicate the required volume for sample collection, the 55-gallon composite or grab composite drums will be marked to indicate 32 gallons, and the 15-gallon drum will be marked for 12 gallons.

   b. Mark the open-top tank to indicate 16, 32, 48 and 64 gallons for the composite sample.

7. Prepare sample labels for trip blanks and attach to sample bottles. A 40 ml glass bottle is used for VOA analysis. Completely fill the bottle with deionized water such that the meniscus extends past the top of the bottle. Place the screw cap on the bottle and ensure that there are no air bubbles in the bottle by inverting and tapping the bottle. Sign a custody seal and place it over the lid of the bottle, but do not cover the septa. Place the bottles in the sample cooler with frozen gel packs.

8. Personnel assigned to sample collections of sludge will don personal protective equipment, as prescribed in the health and safety plan. Perform radio check, and enter the boat using a rope and safety harness. See Procedure II A, Step 8 for heat stress precautions.

9. Sampling equipment required on boat will be one each long-handled rake, one each pond scoop, and 12 each 5-gallon pails.

10. Collection personnel will tie off to the boat using rope and a safety harness.

11. Using safety line ropes, personnel on shore will move and position the boat to the quadrant center for sampling. Locate center of quadrant with the assistance of personnel, aligning boat to stakes on shore. The boat position will be maintained by on-shore support personnel using safety lines.

12. Using the long-handled rake, loosen sludge in the area between pontoons.

13. Use sludge scoop to collect sludge from area loosened by rake.

14. When scoop is full or when necessary, position scoop handle perpendicular to water surface. Pull scoop directly up and out of water. Allow water to drain. Place sludge in container(s).

15. Fill each pail to approximately 3/4 full. Personnel on shore will record time and method of sample collection, and sampling.

16. At the completion of sampling each quadrant, shore personnel will use the safety lines to bring the boat to shore.

17. Sample personnel will hand each bucket to shore personnel for transfer up berm to drums. Empty decontaminated buckets will be put on the boat.

18. Shore personnel will move and position the boat at the center of next quadrant.

19. Transfer sludge from the pails to appropriate drums and composite container (open top tank). Repeat decontamination of pails as described in Step 5 of Procedure II, B, of the SOP.

20. Properly close all storage and treatability drums (i.e., threaded plug or locking ring) as per ATTACHMENT 6.

21. Repeat steps 7 to 19 for remaining three quadrants, filling tank to next indicating mark for each quadrant.

22. Thoroughly mix the contents of the open tank to form a composite sample.

23. Organize sample bottles for characterization of composite sample according to schedule in Table 3.

24. Fill sample containers with sludge from composited sample. Use a stainless steel scoop to transfer the sample.

25. Support personnel in modified Level D personal protective equipment will wash the outside of each sludge sample bottle with water and Alconox™ mixture and place each bottle into the third equipment rinse tub. Rinse the outside of each bottle and towel dry.

    RPT will perform alpha survey and smear each container to confirm effectiveness of radioactive decontamination. Fill in the time of sample collection and sampler's initials on the preprinted sample label using a permanent ink marking pen. Attach the sample label to the sample container and place clear tape over the sample label. Make sure the lids are secure and sign and attach a custody seal over the lid of each container. Place sample bottles into a Ziploc™ bag, seal the bag and place into a cooler to maintain custody.

26. Using buckets, transfer composite sample from composite tank to the 55-gallon drums. Fill each drum to the indicated marks, 32 and 30 gallons.

27. Repeat Steps 30 to 36 Procedure II, G.

28. Packaging and shipping of composite samples for characterization will be conducted according to Procedure II, B.

J. Procedure for Packaging of Treatability Study Sample Volumes:

1. If gross alpha plus gross beta activity is less than the DOT definition of radioactive material (2nCi/g), the samples may be shipped as "Environmental" or "ORM-E". If gross alpha plus gross beta activity exceeds 2 nCi/g, the samples will be packaged in accordance with the DOT requirements for transport of radioactive materials, specifically RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, N.O.S.

   The DOT regulations provide an exception to specification packaging, specific marking and labeling if the material shipped meets the definition of RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY, N.O.S. and the conditions listed in 173.425(b) are addressed. The definition of low specific activity is provided in 49 CFR 173.403(n)(4) and 173.435. The exceptions for low specific activity quantities of radioactive materials are listed in 49 CFR 173.421, 173.422, and 173.424; specific requirements are listed in 49 CFR 173.425.

2. Follow drum inspection procedure in ATTACHMENT 6. Verify that the drum is identified with a sample location number (top and side of drum) and that a custody seal is across the threaded plugs or on the locking bolt. Place two additional signed custody seals over the rim of the locking ring.

   Conduct inspection of exterior of drum for any damage sustained during drum transport to storage. If drum is damaged the contents will be transferred into an undamaged/inspected drum.

3. Review Tables 6 and 8 for package design based on sample type and the DOT Hazard class.

4. Affix an EG&G address label that indicates the consignors address on each side of each drum, located below the bold and on the opposite side. Verify sample number on drum.

5. Mark the drum with proper labeling of "Environmental," "ORM-E," or "Radioactive-LSA." The proper marking and labeling will be dependent upon the DOT Hazard Class listed on Tables 6 and 8. Additional labeling is required that includes the proper shipping name and UN/NA number for hazard class OEM-E and Radioactive-LSA. The proper shipping name for ORM-E will be determined upon review of recent waste characterization sampling results. The shipping labels for the radioactive materials will read "Radioactive-LSA, UN2912, Pu^{239}". Affix "up arrows" to the left of the mailing label on opposite sides of the drum.

6. Using a drum sling attach to the drum or overpack and place the overpack on a 48" x 48" wood pallet. Use the following table for determination of the number of drums per wood pallet.

Drum Size	No. on Pallet
55 gallon	4
30 gallon	5 or 6
15 gallon	8
5 gallon	10

7. Place cardboard corners on the top sides of the drums. Band the drums to the pallet as directed by the Traffic Department.

8. Follow steps 18 to 22 of Procedure II, B.

K. Procedure for Measuring Sludge Levels and Calculating Volumes for Solar Ponds 207A, 207B North, 207B Center, 207B South, and 207C:

K.1 Sludge Measurement

1. Dress in EG&G provided undergarments and coveralls and conduct pre-evolution health and safety brief. Mobilize to Building 788.

2. Don modified Level D personal protective equipment as prescribed in the health and safety plan.

3. Construct a sampling grid by dividing each existing sampling quadrant into four additional subquadrants. Measure the length of each edge for the quadrants, then drive wooden stakes into the top of the berm (beyond the pond liner) at appropriate points. Each pond will have 16 sampling grids.

4. Conduct radio check. Personnel assigned for sludge measurement will don personal protective equipment as prescribed in the health and safety plan, and enter the boat. See Procedure II A, Step 8 for heat stress precautions.

5. Personnel on shore will guide the boat to the center point of the grid aligning boat with the stakes on opposite shores. After the center of the grid has been reached, the boat position will be maintained by on-shore support personnel using the safety lines.

6. Measure the depth of the sludge zone at the bottom of the pond. Push the sludge coliwasa into the sludge zone, rotate gently, and then slowly pull the coliwasa out of the water. Measure the length of the sludge in the coliwasa.

   In the event that sludge is compacted and the coliwasa cannot be submerged to obtain a depth, then a survey rod will be lowered to the top of the sludge. The depth to the top of the sludge will be measured from the top of the pond berm. Once the survey rod is resting on the top of the sludge, a support person on shore will use a hand level on tripod to obtain a reading on the survey rod. To obtain the depth to the top of the sludge in relation to the top of the pond berm, the measurement from the hand level to the top of berm must be obtained and subtracted from the measurement on the survey rod.

   On-shore support personnel will record the measurements, the grid location, time, and method of measurement.

7. Repeat Step 6 for all grid locations.

8. Return to shore. Sample personnel remove protective clothing at the direction of the EG&G RPT.

9. Repeat Step 1 through 8 for all ponds.

10. Decontaminate all equipment as per requirements in Step 6 in Section A of the procedures.

11. EG&G RPT will perform alpha survey and smear each piece of equipment to confirm effectiveness of radioactive decontamination.

K.2 Volume Calculations

1. Logbooks containing data for sludge measurements and engineering drawings for Solar Ponds 207A, 207B North, 207B Center, 207B South, and 207C will be provided to Halliburton NUS.

2. The average sludge depth of a pond will be obtained by adding the individual depth measurements from each grid and then by dividing by the total number of measurements.

3. The volume of sludge will be calculated using the appropriate formula at the Pittsburgh Lab. All dimensions required by the volume formula will be scaled from the engineering drawings.

L. Procedure for Measuring Sludge Levels and Calculating Volumes for the Clarifier:

L.1 Sludge Measurements

1. Dress in E&G provided undergarments and coveralls and conduct pre-evolution health and safety brief. Mobilize to Building 788.

2. Don modified Level D personal protective equipment as prescribed in the health and safety plan.

3. Personnel assigned for sludge measurement will don personal protective equipment as prescribed in the health and safety plan, and proceed to the clarifier bridge.

4. Determine sample locations by dividing the bridge into four equivalent distances. The four sampling points will be numbered 1 to 4 with 1 being the point closest to the bridge entrance. The location of each sampling point will be based on the distance from the clarifier outer wall. All location information will be recorded in the logbook. Measure the cross-sectional area of the coliwasa.

5. Measure the depth of the sludge zone at the bottom of the clarifier. Push the sludge coliwasa into the sludge zone, rotate gently, and then slowly pull the coliwasa out of the water. Measure the length of the sludge and water in the coliwasa. The sludge portion of the sample in the coliwasa will be placed in a sample container, sealed, and labeled according to the sample location. The container will be taken off the bridge to determine the weight of the sludge. Record all measurements in the logbook.

6. Repeat Step 5 for all sampling points.

7. Leave clarifier bridge. Sample personnel remove protective clothing at the direction of the EG&G RPT.

8. Decontaminate all equipment as per requirements in Step 6 in Procedure II, A.

9. EG&G RPT will perform alpha survey and smear each piece of equipment to confirm effectiveness of radioactive decontamination.

10. Support personnel will take sample container to Building 788 to be weighed. Record the weight of each container in the logbook. Return container to clarifier and dump sludge into clarifier. Return empty containers to Building 788 to be weighed. Record weight of containers in logbook and then return to sampling area.

11. Repeat steps 8 and 9 for empty buckets.

L.2 Volume Calculations

1. Logbooks containing data for sludge measurements and engineering drawings for the clarifier will be provided to Halliburton NUS.

2. The sludge depth will be based on the average of the four readings obtained from the bridge.

3. The volume of sludge will be calculated using the appropriate formula at the Pittsburgh Lab. All dimensions required by the volume formula will be scaled from the engineering drawings.

RADIOLOGICAL/HEALTH & SAFETY WORK PERMIT

Instructions and requirements for the use of this form are contained in H&S 6.05 Radiological/H&S Work Permit

SECTION I - JOB INFORMATION (To be completed by job supervisor or permit initiator)

Job Name _____ Auth or WO # _____

Bldg. _____ Room # _____ Date _____ From _____ (AM/PM) To _____ (AM/PM)

Scope of Work _____

SECTION II - DESCRIPTION OF HAZARDS (To be completed by responsible user)

MATERIAL HAZARDS

____ HNO_3 (Nitric Acid)
____ HCl (Hydrochloric Acid)
____ H_2SO_4 (Sulfuric Acid)
____ HF (Hydrofluoric Acid)
____ Caustic
____ Flammables
____ Trichloroethylene
____ Beryllium
____ Plutonium
____ Uranium
____ Asbestos

ELECTRICAL HAZARDS

Energized System?
____ Yes ____ No
____ 120V
____ 220V
____ 480V
____ 600V
____ Above 600V
_____ V
____ Laser Involved?
____ Microwave Involved?

HIGH TEMP/HIGH PRESSURE

____ Vacuum
____ Ambient Pressure
____ <15 psig
____ >15 psig
_____ psig
____ Below Ambient Temp
_____ °F
____ Ambient Temp
____ Above Ambient Temp
_____ °F
____ Steam System
____ Hydraulic System

Fire Suppression Interruption? ____ Yes ____ No

Other hazards and precautions _____

SECTION III - RADIOLOGICAL AND NONRADIOLOGICAL SAFETY REQUIREMENTS (To be completed by Radiological Protection, and/or H&S Area Engineer).

JSA REQUIRED ____Yes ____No
JOBSITE REVIEW REQUIRED ____Yes ____No

'A' PACKAGE REQUIRED ____Yes ____No
RADIOLOGICAL PROTECTION TECHNOLOGIST (RPT) REQUIRED ____ YES ____ NO

PROTECTIVE APPAREL

____ Coveralls
____ Tyvek Suit
____ Plastic Suit
____ Acid Suit
____ Surgeon's Gloves
____ Plastic Gloves
____ Rubber Gloves
____ Leather Gloves
____ Cloth Cap
____ Cloth Hood
____ Plastic Hood
____ Booties
____ Plastic Booties
____ Rubber Boots
____ Safety Glasses
____ Goggles
____ Face Shield
____ Hard Hat
____ Hearing Protection
____ Taped Openings
____ Other _____

CONTAMINATION CONTROL VENTILATION REQUIREMENTS

____ Containment Pen
____ Plastic House
____ SBA House
____ Plastic Sleeve
____ Glove Bag
____ Air Mover
____ Down Draft
____ GB Exhaust
____ Other _____

RESPIRATORY REQUIREMENTS

____ Half Mask
____ Full Face
____ Supplied Breathing Air
____ SCBA
____ Chemical Canister

RADIOLOGICAL PROTECTION REQUIREMENTS

____ Start of job
____ On call
____ Full time

DOSIMETRY REQUIREMENTS

____ TLD Dosimeter
____ Extremity Dosimeter
____ Special Dosimeter

ELECTRICAL PROTECTION REQUIREMENTS
(Consult Job Supervisor)

____ Insulating Mat
____ Insulating Blanket
____ Cover up
____ High Voltage Sleeves
____ High Voltage Gloves
_____ Class I
_____ Class II
____ Hot Sticks
____ TIC Tracer
____ Insulated Bucket Truck
____ Grounding Cable
____ Grounding Stick

RADIOLOGICAL PROTECTION PRE-JOB SURVEY

Contamination levels and extent _____

Gamma _____
Neutron _____
Limitations _____

RPT Signature

RADIOLOGICAL PROTECTION POST-JOB SURVEY

Contamination levels and extent _____

Gamma _____
Neutron _____

RPT Signature

Other Special Requirements _____

RF-13010 (Rev. 3/90) Supercedes Previous Issues

Page 1 of 2

RADIOLOGICAL/HEALTH & SAFETY WORK PERMIT - CONTINUED

Auth or WO # _____ Date _____

SECTION IV - PREPARATION FOR THE JOB (To be completed by the responsible user and job supervisor)

The area or equipment is ready to be worked on and is in safe condition	____ Yes	
The necessary systems have been shutdown, drained, blanked, etc.	____ Yes	____ N/A
The necessary systems have been locked out/tagged out. # _____	____ Yes	____ N/A
Voltage checked after lock out.	____ Yes	____ N/A
Utilities has been notified of upcoming work and is prepared.	____ Yes	____ N/A
The Fire Department has been notified of upcoming work and is prepared.	____ Yes	____ N/A

SECTION V - APPROVAL SIGNATURES

THE ABOVE REQUIREMENTS HAVE BEEN REVIEWED WITH AND ARE UNDERSTOOD BY ALL JOB PERSONNEL.

_____

_____

(Job personnel signatures)

The Building Manager (or designee) has been notified of upcoming work _____
(notifier's initials)

THE SIGNATURES BELOW INDICATE REVIEW AND CONCURRENCE WITH THE WORK PERMIT.

_____ Responsible User

_____ Job Supervisor

_____ RPT Foreman (if applicable)

_____ Contractor Supervisor (if applicable)

_____ H&S Area Engineer

_____ Other

SECTION VI - PERMIT EXTENSION

WORK PERMIT EXTENDED TO: _____

_____ H&S Area Engineer

Job Supervisor agrees to tour area daily to ensure compliance with H&S requirements. (Initials required for each day of extension)

Dates: _____ _____ _____ _____ _____ _____ _____

Initials: _____ _____ _____ _____ _____ _____ _____

DISTRIBUTION

Job Supervisor -	White (retain permanently with job file)
Responsible User -	Blue (retain for 30 days)
Radiological Protection -	Yellow (retain for 30 days)
H&S Area Engineer-	Buff (Info copy)

POST CARD AT JOB SITE

FIRE AND EMERGENCY - DIAL 2911

EG&G ROCKY FLATS

SHIPPING MEMO

RF No. 06692

FROM: EG&G ROCKY FLATS, INC.
FOR: U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
P.O. BOX 464
GOLDEN, COLORADO 80402-0464

TO:

ATTN:
FOR:
ORDER NO.:

Material Classification _____

Ship Via _____

B/L No. _____

Date Shipped _____ Partial _____ Final _____

Freight Code _____ Prepaid _____ Collect _____

Order No. _____

DJO No. _____

Cash _____ Non Cash _____ No Charge _____

CONTAINER DATA				CONTENTS	
Number	Type	Size	Gross Wt.	Quantity	Description

TOTAL CONTAINERS _____

TOTAL WEIGHT _____

D.O.T. Permit No. _____ DC No. _____

Radiation Group _____ Curies _____

Surface Contamination _____ C/M

Radiation-Surface _____ MR/HR

Radiation-1Meter _____ MR/HR

Requested By _____

Packed By _____ Bldg. _____

Authorized By _____ Date _____

Received By _____ Date _____

1-WHITE-CONSIGNEE
2-YELLOW-CONSIGNOR RECEIPT
3-GREEN-ACCOUNTING
4-WHITE-TRAFFIC
5-WHITE-NMC
6-WHITE-BUS. MGMT.-SP. PROG.
7-YELLOW-PICKUP RECEIPT
8-WHITE-PROCUREMENT
9-WHITE-PACKING REQUEST
10-WHITE-PACKING LIST

RF-24320 (12/89) DESTROY PREVIOUS ISSUES

CONSIGNEE

ATTACHMENT 2
ROCKY FLATS PLANT
SHIPPING MEMO
(RF-24320)

RADIOACTIVE SHIPMENT PREPARATION CERTIFICATION 29067

This form must be completed for each container in a shipment, except for multiple identical containers. For these, one form must be completed for each group. For commercial shipments, forward original to Traffic with Shipping Memo. For shipments via Ross Aviation or courier, departing from Bldg. 991, send the original to Bldg. 991 with the shipment and send one carbon copy to Traffic. Bldg. 991 will forward original to Traffic when shipment departs.

PLEASE KEEP THIS FORM UNCLASSIFIED

If the material form is other than routine (see instructions), this information must be included under Remarks, unless classified; in such cases, use the Courier Request Form, RFC-46344, and reference the Courier Request number. If the material quantity is classified, please reference the Courier Request number instead of grams and curies.

MATERIAL HANDLING & PACKAGING/OR PRODUCT WAREHOUSE COMPLETES THIS SECTION

Radioisotope	Material Quantity	Transport Index	
	Grams _____		Shipping Memo No. RF _____
	Curies _____		Material Classification _____

Material Form	Quantity Type	Fissile Class	Mode	Container:
Metal ☐	Limited ☐	I ☐	Courier ☐	Description _____ Type: A ☐ B ☐
Liquid ☐	Type A ☐	II ☐	Ross ☐	Size _____ Weight _____
Gas ☐	Type B ☐	III ☐	Commercial	DOE Al 5610.1 Exemption No. _____
Solid Other Than Metal ☐	LSA ☐		Surface ☐	DOT Spec. No. _____
			Air ☐	Certificate of Compliance No. _____

Remarks or Special Considerations	Marking on Container	Labels Applied

Packaging Procedure No. Operational/Job Safety Analysis No.	Type Seals Applied

Container Number(s) (Multiple Listing for Identical Containers)

Employee performing packaging:

Signature _____ Employee No. _____ Date _____

Supervisor hereby certifies the correct procedure was properly followed and container correctly marked, labeled and sealed.

Signature _____ Employee No. _____ Date _____

PRODUCT WAREHOUSE VERIFIES SHIPMENT AND COMPLETES THIS SECTION

(For shipments from buildings other than 991 to be made via Ross Aviation or courier)

_____ Employee No. _____ Date _____

Product Warehouse Manager

RADIATION MONITORING COMPLETES THIS SECTION

For shipments with Bldg. 991 as off-site departure point, gamma and neutron readings will be performed in originating building; surface contamination levels will be taken in Bldg. 991. Other shipments are to be signed off from their respective buildings.

Surface of Shipping Container	1 Meter From Shipping Container	Surface Contamination of Shipping Container
MR/HR _____ / _____	MR/HR _____ / _____	d/m/100 cm² _____
Gamma Neutron	Gamma Neutron	

Packaging building monitoring performed by:

Signature _____ Employee No. _____ Date _____

991 monitoring performed by:

Signature _____ Employee No. _____ Date _____

See page 2 for monitoring results of multiple containers.

RF-46404 (Rev 4/87)

EG&G ROCKY FLATS

SHIPPING MEMO

RF No. 07829

FROM: EG&G ROCKY FLATS, INC.
FOR: U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
P.O. BOX 464
GOLDEN, COLORADO 80402-0464

TO: TWIN CITY TESTING CORPORATION
1908 INNERBELT BUSINESS CENTER DRIVE
ST. LOUIS, MISSOURI 63114

ATTN: DR. ROBERT HOUSER
FOR: RADIATION PROTECTION OFFICER
ORDER NO.:

Material Classification UNCLASSIFIED
Ship Via TRUCK
B/L No. 05854
Date Shipped 3/27/91 Partial _____ Final _____
Freight Code _____ Prepaid X Collect _____
Order No. WESTON W.O.# 2029-33-14
DJO No. _____
Cash _____ Non Cash _____ No Charge _____
YELLOW FREIGHT SYSTEMS

CONTAINER DATA				CONTENTS	
Number	Type	Size	Gross Wt.	Quantity	Description
1	pallet w/	41x41x31 inches	107 LBS		
4	CARTONS	19"x22"x13"		16	RADIOACTIVE MATERIAL, LIMITED QUANTITY, N.O.S., UN2910, LIQUID, VIZ PONDCRETE SAMPLES 9" x 9" x 14" EACH; DOT 12A-20 12B-30
1	CARTON	19"x22"x13"		3	RADIOACTIVE MATERIAL, LIMITED QUANTITY, N.O.S., UN2910, LIQUID, VIZ PONDCRETE SAMPLES 9" x 9" x 14" EACH; DOT 12A-20 12B-30
					This package conforms to the conditions and limitations specified in 49 CFR Part 173.4[illegible] for excepted radioactive materials, limited quantity, n.o.s. UN2910
					INSIDE CONTAINERS ARE MARKED "RADIOACTIVE" ABSORBENT MATERIAL VERMICULITE

TOTAL CONTAINERS 1
TOTAL WEIGHT 107 LBS

D.O.T. Permit No. _____ DC No. _____
Radiation Group _____ Curies _____
Surface Contamination _____ C/M
Radiation-Surface _____ MR/HR
Radiation-1 Meter _____ MR/HR

Requested By Mark Selman, R.F. WESTON, INC.
Packed By _____ Bldg. PC
Authorized By _____ Date _____
Received By _____ Date _____

1-WHITE-CONSIGNEE
2-YELLOW-CONSIGNOR RECEIPT
3-GREEN-ACCOUNTING
4-WHITE-TRAFFIC
5-WHITE-NMC
6-WHITE-BUS. MGMT.-SP. PROG.
7-YELLOW-PICKUP RECEIPT
8-WHITE-PROCUREMENT
9-WHITE-PACKING REQUEST
10-WHITE-PACKING LIST

ATTACHMENT 4
COMPLETED ROCKY FLATS PLANT
SHIPPING MEMO
(RF-24320)

NUS CORPORATION — **CHAIN OF CUSTODY RECORD**

PROJECT NO.:	SITE NAME:	NO. OF CONTAINERS							REMARKS
SAMPLERS (SIGNATURE):									
STATION NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION				

RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:	REMARKS:	

NUS 4410 34 0484

ATTACHMENT 6

DRUM INSPECTION AND CLOSURE PROCEDURE

1. Inspect the bottom of the drum for stamped DOT certification.

2. Make sure drum is painted gray for Environmental or white and black for ORM-E specified samples; and white for Radioactive - LSA specified samples per RFPM - MAT 20-005 "Color Coding for Drums" (Attachment 7). Tables 6 and 7 summarize the DOT hazard class specifications.

3. Perform general inspection of drum for damage. Refer to WO 1101 for guidance on drum inspection. If the drum has any damage, it will require overpacking in a larger drum (i.e. 15 gallon drum in 30 gallon drum, or 55 gallon drum in 85 gallon overpack). Refer to Section II J Steps 3-13.

4. Remove the lid and inspect the interior of the drum for damage.

5. Proceed with sample collection and packaging as specified in the appropriate sampling procedure of this Standard Operating Procedure.

DRUM CLOSURE PROCEDURE

Shipping containers are closed by securing the lids and installing security seals as follows: WARNINGS - Inhalation of radioactive contamination is possible during this process. A full-face respirator must be worn during this operation. A radiation hazard is present with this process. Personal injury is possible during this process. Leather gloves must be worn when handling the shipping containers.

1. Place the lid and the locking ring on the shipping container; position the ring so the bolt is 180° from longitudinal seam on the container (see Drawing P15042) and the locking ring lugs are down.

2. Install a 1/4 -- 5/16 inch diameter bolt through the unthreaded lug, and then through the threaded lug of the locking ring.

3. Initially tighten the bolt using an impact wrench or other appropriate tool. Tap the locking ring with a soft-headed hammer while tightening the bolt.

4. Use a calibrated torque wrench to tighten the locking ring bolt to the torque listed on the following schedule. While torquing the bolt, continue to tap the locking ring with a soft-headed hammer. If the ends of the locking ring close before the bolt reaches the proper torque, discard the ring and/or other defective material and obtain replacements.

DRUM SIZE GALLONS	BOLT SIZE INCH	SET TORQUE WRENCH @(Ft-lbs)
5	1/4 - 5/16	10
10	3/8	20
10	1/2	30
30	5/8	45
55	5/8	45

5. Install the locknut on the end of the bolt protruding through the threaded lug.

6. Use a socket or impact wrench or other appropriate tool to tighten the locknut.

After drum is closed and sealed, proceed with movement of drum as outlined in the appropriate procedure.

July 31, 1987
Replaces 11/15/83

COLOR CODING FOR DRUMS

POLICY

Various types of waste and scrap will be segregated into color-coded drums for ease of identification and to minimize the need for rehandling and repackaging.

Black and dark blue drums will be used exclusively for packaging and shipping product internally or offsite.

DEFINITIONS:

Waste: Material deemed to have no recoverable value or material which has been determined to be below the economic discard level.

Scrap: Material which can be recycled for productive use either at Rocky Flats or elsewhere and Pu/Oy-contaminated material which exceeds the economic discard level. No hazardous waste drums will be reused without authorization of traffic or waste operations.

SCOPE:

Waste and scrap will be stored in 55-gallon drums in accordance with the following color code:

1. White serialized drums will be used exclusively for the following:

   a. Radioactively contaminated waste.
   b. Beryllium-contaminated waste.
   c. Plutonium-contaminated scrap for Pu recovery.
   d. Plutonium-contaminated scrap for recovery of other material.
   e. Contaminated or uncontaminated classified shapes or tooling designated as waste. These drums will be serialized by P&NMC for control purposes.
   f. Contaminated tooling being held for future use.
   g. Uranium-233 and neptunium-237 scrap and waste.
   h. Mixed (radioactive and hazardous) waste.
   i. D-38 contaminated liquid waste (bung-type drum only).

MAT(28)

2. Light Blue drums will be used exclusively for nonradioactively contaminated beryllium scrap to be recycled at Rocky Flats or another facility.

3. Orange drums will be used exclusively for storage of depleted-uranium (238U) scrap and machine turnings and depleted-uranium-alloy scrap to be recycled at Rocky Flats or another facility.

4. Yellow or gray drums will be used exclusively for non-contaminated non-hazardous waste or scrap or any other material not identified herein.

5. Red drums will be used exclusively for firefighting and related materials.

6. White/Black (two-tone, white on ends, black in center) drums (either 30 or 55 gallon open top and 55 gallon bung type) will be used exclusively for non-radioactive, hazardous waste.

7. Light Green closed-head (bung type) drums will be used exclusively for non-radioactive, non-hazardous oils.

RESPONSIBILITIES:

Procurement Department is responsible for purchasing and maintaining a supply of drums painted in accordance with SCOPE, above, except all white and white/black drums will be purchased and controlled by Waste Operations.

Users are responsible for marking the contents on the drum; affixing proper labels (corrosive, flammable, etc.) designating andy other hazard (pyrophoric metal turnings). White drums will not be stenciled without specific authorization from Waste Operations.

Building Superintendents are responsible for stenciling dumpsters and other metal containers used for collecting cold waste outside of the buildings as well as for compliance with drum labeling within the buildings.

Persons having questions concerning this policy should contact Waste Operations on Extension 2873 or Traffic on Extension 2378.

REFERENCES:

1. RFPM MAT 20-006, "Control of Serialized White, Dark Blue, or Black Drums and Waste Boxes"

APPROVED: [signature]